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(54) Title: NEISSERIAL ANTIGENIC PEPTIDES

(57) Abstract: This invention provides, among other things, proteins, polypeptides, and fragments thereof, derived from the bacteria *Neisseria meningitidis* B. Also provided are nucleic acids encoding for such proteins, polypeptides, and/or fragments, as well as nucleic acids complementary thereto *e.g.*, antisense nucleic acids). Additionally, this invention provides antibodies which bind to the proteins, polypeptides. and/or fragments. This invention further provides expression vectors useful for making the proteins, polypeptides, and/or fragments, as well as host cells transformed with such vectors. This invention also provides compositions of the proteins, polypeptides, fragments, and/or nucleic acids, for use as vaccines, diagnostic reagents, immunogenic compositions, and the like. Methods of making the compositions and methods of treatment with the compositions are also provided. This invention also provides methods of detecting the proteins, polypeptides, fragments, and/or nucleic acids.

NEISSERIAL ANTIGENIC PEPTIDES

All documents cited herein are incorporated by reference in their entirety.

TECHNICAL FIELD

This invention relates to antigenic peptide sequences from the bacteria *Neisseria meningitidis* and *Neisseria gonorrhoea*.

BACKGROUND ART

N.meningitidis is a non-motile, Gram-negative diplococcus that is pathogenic in humans.

Based on the organism's capsular polysaccharide, 12 serogroups of *N.meningitidis* have been identified. Group A is the pathogen most often implicated in epidemic disease in sub-Saharan Africa. Serogroups B and C are responsible for the vast majority of cases in the United States and in most developed countries. Serogroups W135 and Y are responsible for the rest of the cases in the United States and developed countries.

The meningococcal vaccine currently in use is a tetravalent polysaccharide vaccine composed of serogroups A, C, Y and W135. Meningococcus B remains a problem, however. The polysaccharide approach cannot be used because the menB capsular polysaccharide is a polymer of α(2-8)-linked *N*-acetyl neuraminic acid that is also present in mammalian tissue. One approach to a menB vaccine uses mixtures of outer membrane proteins (OMPs) To overcome the antigenic variability, multivalent vaccines containing up to nine different porins have been constructed [*e.g.*, Poolman JT (1992) Development of a meningococcal vaccine. *Infect. Agents Dis.* 4:13-28]. Additional proteins to be used in outer membrane vaccines have been the opa and opc proteins, but none of these approaches have been able to overcome the antigenic variability [*e.g.*, Ala'Aldeen & Borriello (1996)]. The meningococcal transferrin-binding proteins 1 and 2 are both surface exposed and generate bactericidal antibodies capable of killing homologous and heterologous strains. [*Vaccine* 14(1):49-53].

DISCLOSURE OF THE INVENTION

The invention provides fragments of the proteins disclosed in international patent applications WO99/57280 and WO00/22430 (the "International Applications"), wherein the fragments comprise at least one antigenic determinant.

Thus, if the length of any particular protein sequence disclosed in the International Applications is *x* amino acids, the present invention provides fragments of at most *x-1* amino acids of that protein. The fragment may be shorter than this (*e.g.*, *x-2*, *x-3*, *x-4*, ...), and is

preferably 100 amino acids or less (*e.g.*, 90 amino acids, 80 amino acids *etc.*). The fragment may be as short as 3 amino acids, but is preferably longer (*e.g.*, up to 5, 6, 7, 8, 9, 10, 12, 15, 20, 25, 30, 35, 40, 50, 75, or 100 amino acids).

Preferred fragments comprise the meningococcal peptide sequences disclosed in Table 1, or sub-sequences thereof. The fragments may be longer than those given in Table 1 *e.g.*, where a fragment in Table 1 runs from amino acid residue *p* to residue *q* of a protein, the invention also relates to fragments from residue (*p-1*), (*p-2*), or (*p-3*) to residue (*q+1*), (*q+2*), or (*q+3*).

The invention also provides polypeptides that are homologous (i.e., have sequence identity) to these fragments. Depending on the particular fragment, the degree of sequence identity is preferably greater than 50% (*e.g.*, 60%, 70%, 80%, 90%, 95%, 99% or more). These homologous polypeptides include mutants and allelic variants of the fragments. Identity between the two sequences is preferably determined by the Smith-Waterman homology search algorithm as implemented in the MPSRCH program (Oxford Molecular), using an affine gap search with parameters *gap open penalty*=12 and *gap extension penalty*=1.

The invention also provides proteins comprising one or more of the above-defined fragments.

The invention is subject to the proviso that it does not include within its scope proteins limited to any of the full length protein sequences disclosed in the International Applications (*i.e.*, the even SEQ IDs: 2-3020 of WO99/57280 and the odd SEQ IDs: 963-1045 of WO00/22430).

The proteins of the invention can, of course, be prepared by various means (*e.g.*, recombinant expression, purification from cell culture, chemical synthesis *etc.*) and in various forms (*e.g.*, native, C-terminal and/or N-terminal fusions *etc.*). They are preferably prepared in substantially pure form (*i.e.*, substantially free from other Neisserial or host cell proteins). Short proteins are preferably produced using chemical peptide synthesis.

According to a further aspect, the invention provides antibodies which recognise the fragments of the invention, with the proviso that the invention does not include within its scope antibodies which recognise any of the complete protein sequences in the International Applications. The antibodies may be polyclonal or monoclonal, and may be produced by any suitable means.

The invention also provides proteins comprising peptide sequences recognised by these antibodies. These peptide sequences will, of course, include fragments of the meningococcal

proteins in the International Applications, but will also include peptides that mimic the antigenic structure of the meningococcal peptides when bound to immunoglobulin.

According to a further aspect, the invention provides nucleic acid encoding the fragments and proteins of the invention, with the proviso that the invention does not include within its scope nucleic acid encoding any of the full length protein sequences in the International Applications. The nucleic acids may be as short as 10 nucleotides, but are preferably longer (*e.g.,* up to 10, 12, 15, , 18, 20, 25, 30, 35, 40, 50, 75, or 100 nucleotides).

In addition, the invention provides nucleic acid comprising sequences homologous (*i.e.,* having sequence identity) to these sequences. The degree of sequence identity is preferably greater than 50% (*e.g.,* 60%, 70%, 80%, 90%, 95%, 99% or more). Furthermore, the invention provides nucleic acid which can hybridise to these sequences, preferably under "high stringency" conditions (*e.g.,* 65°C in a 0.1xSSC, 0.5% SDS solution).

It should also be appreciated that the invention provides nucleic acid comprising sequences complementary to those described above (*e.g.,* for antisense or probing purposes).

Nucleic acid according to the invention can, of course, be prepared in many ways (*e.g.,* by chemical synthesis, from genomic or cDNA libraries, from the organism itself *etc.*) and can take various forms (*e.g.,* single stranded, double stranded, vectors, probes *etc.*). In addition, the term "nucleic acid" includes DNA and RNA, and also their analogues, such as those containing modified backbones, and also peptide nucleic acids (PNA), *etc.*

According to a further aspect, the invention provides vectors comprising nucleotide sequences of the invention (*e.g.,* expression vectors) and host cells transformed with such vectors.

According to a further aspect, the invention provides compositions comprising protein, antibody, and/or nucleic acid according to the invention. These compositions may be suitable as vaccines, for instance, or as diagnostic reagents, or as immunogenic compositions.

The invention also provides nucleic acid, protein, or antibody according to the invention for use as medicaments (*e.g.,* as vaccines or as immunogenic compositions) or as diagnostic reagents. It also provides the use of nucleic acid, protein, or antibody according to the invention in the manufacture of: (i) a medicament for treating or preventing infection due to Neisserial bacteria; (ii) a diagnostic reagent for detecting the presence of Neisserial bacteria or of antibodies raised against Neisserial bacteria; and/or (iii) a reagent which can raise

antibodies against Neisserial bacteria. Said Neisserial bacteria may be any species or strain (such as *N. gonorrhoeae*) but are preferably *N. meningitidis*, especially strain A or strain B.

The invention also provides a method of treating a patient, comprising administering to the patient a therapeutically effective amount of nucleic acid, protein, and/or antibody according to the invention.

According to further aspects, the invention provides various processes, for example:

A process for producing proteins of the invention is provided, comprising the step of culturing a host cell according to the invention under conditions which induce protein expression;

A process for producing protein or nucleic acid of the invention is provided, wherein the protein or nucleic acid is synthesised in part or in whole using chemical means;

A process for detecting polynucleotides of the invention is provided, comprising the steps of: (a) contacting a nucleic probe according to the invention with a biological sample under hybridizing conditions to form duplexes; and (b) detecting said duplexes; and

A process for detecting proteins of the invention is provided, comprising the steps of: (a) contacting an antibody according to the invention with a biological sample under conditions suitable for the formation of an antibody-antigen complexes; and (b) detecting said complexes.

A summary of standard techniques and procedures which may be employed in order to perform the invention (*e.g.*, to utilise the disclosed sequences for vaccination or diagnostic purposes) follows. This summary is not a limitation on the invention but, rather, gives examples which may be used, but which are not required.

General

The practice of the present invention will employ, unless otherwise indicated, conventional techniques of molecular biology, microbiology, recombinant DNA, and immunology, which are within the skill of the art. Such techniques are explained fully in the literature *e.g.*, Sambrook *Molecular Cloning; A Laboratory Manual, Second Edition* (1989); *DNA Cloning, Volumes I and ii* (D.N Glover ed. 1985); *Oligonucleotide Synthesis* (M.J. Gait ed, 1984); *Nucleic Acid Hybridization* (B.D. Hames & S.J. Higgins eds. 1984); *Transcription and Translation* (B.D. Hames & S.J. Higgins eds. 1984); *Animal Cell Culture* (R.I. Freshney ed. 1986); *Immobilized Cells and Enzymes* (IRL Press, 1986); B. Perbal, *A Practical Guide to Molecular Cloning* (1984); the *Methods in Enzymology* series (Academic Press, Inc.), especially volumes 154 & 155; *Gene Transfer Vectors for Mammalian Cells* (J.H. Miller and M.P. Calos eds. 1987, Cold Spring Harbor Laboratory); Mayer and Walker, eds. (1987), *Immunochemical Methods in Cell and Molecular Biology* (Academic Press, London); Scopes, (1987) *Protein Purification: Principles and Practice*, Second Edition

(Springer-Verlag, N.Y.), and *Handbook of Experimental Immunology, Volumes I-IV* (D.M. Weir and C. C. Blackwell eds 1986).

Standard abbreviations for nucleotides and amino acids are used in this specification.

All publications, patents, and patent applications cited herein are incorporated in full by reference.

Definitions

A composition containing X is "substantially free of" Y when at least 85% by weight of the total X+Y in the composition is X. Preferably, X comprises at least about 90% by weight of the total of X+Y in the composition, more preferably at least about 95% or even 99% by weight.

The term "comprising" means "including" as well as "consisting" *e.g.*, a composition "comprising" X may consist exclusively of X or may include something additional to X, such as X+Y.

The term "antigenic determinant" includes B-cell epitopes and T-cell epitopes.

The term "heterologous" refers to two biological components that are not found together in nature. The components may be host cells, genes, or regulatory regions, such as promoters. Although the heterologous components are not found together in nature, they can function together, as when a promoter heterologous to a gene is operably linked to the gene. Another example is where a meningococcal sequence is heterologous to a mouse host cell. A further examples would be two epitopes from the same or different proteins which have been assembled in a single protein in an arrangement not found in nature.

An "origin of replication" is a polynucleotide sequence that initiates and regulates replication of polynucleotides, such as an expression vector. The origin of replication behaves as an autonomous unit of polynucleotide replication within a cell, capable of replication under its own control. An origin of replication may be needed for a vector to replicate in a particular host cell. With certain origins of replication, an expression vector can be reproduced at a high copy number in the presence of the appropriate proteins within the cell. Examples of origins are the autonomously replicating sequences, which are effective in yeast; and the viral T-antigen, effective in COS-7 cells.

Expression systems

The meningococcal nucleotide sequences can be expressed in a variety of different expression systems; for example those used with mammalian cells, baculoviruses, plants, bacteria, and yeast.

i. Mammalian Systems

Mammalian expression systems are known in the art. A mammalian promoter is any DNA sequence capable of binding mammalian RNA polymerase and initiating the downstream (3') transcription of a coding sequence (*e.g.*, structural gene) into mRNA. A promoter will have a transcription initiating region, which is usually placed proximal to the 5' end of the coding sequence, and a TATA box, usually located 25-30 base pairs (bp) upstream of the transcription initiation site. The TATA box is thought to direct RNA polymerase II to begin RNA synthesis at the correct site. A mammalian promoter will also contain an upstream promoter element, usually located within 100 to 200 bp upstream of the TATA box. An upstream promoter element determines the rate at which transcription is initiated and can act in either orientation [Sambrook et al. (1989) "Expression of Cloned Genes in Mammalian Cells." In *Molecular Cloning: A Laboratory Manual, 2nd ed.].*

Mammalian viral genes are often highly expressed and have a broad host range; therefore sequences encoding mammalian viral genes provide particularly useful promoter sequences. Examples include the SV40 early promoter, mouse mammary tumor virus LTR promoter, adenovirus major late promoter (Ad MLP), and herpes simplex virus promoter. In addition, sequences derived from non-viral genes, such as the murine metallotheionein gene, also provide useful promoter sequences. Expression may be either constitutive or regulated (inducible), depending on the promoter can be induced with glucocorticoid in hormone-responsive cells.

The presence of an enhancer element (enhancer), combined with the promoter elements described above, will usually increase expression levels. An enhancer is a regulatory DNA sequence that can stimulate transcription up to 1000-fold when linked to homologous or heterologous promoters, with synthesis beginning at the normal RNA start site. Enhancers are also active when they are placed upstream or downstream from the transcription initiation site, in either normal or flipped orientation, or at a distance of more than 1000 nucleotides from the promoter [Maniatis et al. (1987) *Science 236:*1237; Alberts et al. (1989) *Molecular Biology of the Cell*, 2nd ed.]. Enhancer elements derived from viruses may be particularly useful, because they usually have a broader host range. Examples include the SV40 early gene enhancer [Dijkema et al (1985) *EMBO J. 4:*761] and the enhancer/promoters derived from the long terminal repeat (LTR) of the Rous Sarcoma Virus [Gorman et al. (1982b) *Proc. Natl. Acad. Sci. 79:*6777] and from human cytomegalovirus [Boshart et al. (1985) *Cell 41:*521]. Additionally, some enhancers are regulatable and become active only in the presence of an inducer, such as a hormone or metal ion [Sassone-Corsi and Borelli (1986) *Trends Genet.* 2:215; Maniatis et al. (1987) *Science* 236:1237].

A DNA molecule may be expressed intracellularly in mammalian cells. A promoter sequence may be directly linked with the DNA molecule, in which case the first amino acid at the N-terminus of the recombinant protein will always be a methionine, which is encoded by the ATG start codon. If desired, the N-terminus may be cleaved from the protein by *in vitro* incubation with cyanogen bromide.

Alternatively, foreign proteins can also be secreted from the cell into the growth media by creating chimeric DNA molecules that encode a fusion protein comprised of a leader sequence fragment that provides for secretion of the foreign protein in mammalian cells. Preferably, there are processing sites encoded between the leader fragment and the foreign gene that can be cleaved either *in vivo* or *in vitro*. The leader sequence fragment usually encodes a signal peptide comprised of hydrophobic amino acids which direct the secretion of the protein from the cell. The adenovirus triparite leader is an example of a leader sequence that provides for secretion of a foreign protein in mammalian cells.

Usually, transcription termination and polyadenylation sequences recognized by mammalian cells are regulatory regions located 3' to the translation stop codon and thus, together with the promoter elements, flank the coding sequence. The 3' terminus of the mature mRNA is formed by site-specific post-transcriptional cleavage and polyadenylation [Birnstiel et al. (1985) *Cell 41:*349; Proudfoot and Whitelaw (1988) "Termination and 3' end processing of eukaryotic RNA. In *Transcription and splicing* (ed. B.D. Hames and D.M. Glover); Proudfoot (1989) *Trends Biochem. Sci. 14:*105]. These sequences direct the transcription of an mRNA which can be translated into the polypeptide encoded by the DNA. Examples of transcription

terminator/polyadenylation signals include those derived from SV40 [Sambrook et al (1989) "Expression of cloned genes in cultured mammalian cells." In *Molecular Cloning: A Laboratory Manual*].

Usually, the above described components, comprising a promoter, polyadenylation signal, and transcription termination sequence are put together into expression constructs. Enhancers, introns with functional splice donor and acceptor sites, and leader sequences may also be included in an expression construct, if desired. Expression constructs are often maintained in a replicon, such as an extrachromosomal element (*e.g.*, plasmids) capable of stable maintenance in a host, such as mammalian cells or bacteria. Mammalian replication systems include those derived from animal viruses, which require trans-acting factors to replicate. For example, plasmids containing the replication systems of papovaviruses, such as SV40 [Gluzman (1981) *Cell 23*:175] or polyomavirus, replicate to extremely high copy number in the presence of the appropriate viral T antigen. Additional examples of mammalian replicons include those derived from bovine papillomavirus and Epstein-Barr virus. Additionally, the replicon may have two replicaton systems, thus allowing it to be maintained, for example, in mammalian cells for expression and in a prokaryotic host for cloning and amplification. Examples of such mammalian-bacteria shuttle vectors include pMT2 [Kaufman et al. (1989) *Mol. Cell. Biol. 9*:946] and pHEBO [Shimizu et al. (1986) *Mol. Cell. Biol. 6*:1074].

The transformation procedure used depends upon the host to be transformed. Methods for introduction of heterologous polynucleotides into mammalian cells are known in the art and include dextran-mediated transfection, calcium phosphate precipitation, polybrene mediated transfection, protoplast fusion, electroporation, encapsulation of the polynucleotide(s) in liposomes, and direct microinjection of the DNA into nuclei.

Mammalian cell lines available as hosts for expression are known in the art and include many immortalized cell lines available from the American Type Culture Collection (ATCC), including but not limited to, Chinese hamster ovary (CHO) cells, HeLa cells, baby hamster kidney (BHK) cells, monkey kidney cells (COS), human hepatocellular carcinoma cells (*e.g.*, Hep G2), and a number of other cell lines.

ii. Baculovirus Systems

The polynucleotide encoding the protein can also be inserted into a suitable insect expression vector, and is operably linked to the control elements within that vector. Vector construction employs techniques which are known in the art. Generally, the components of the expression system include a transfer vector, usually a bacterial plasmid, which contains both a fragment of the baculovirus genome, and a convenient restriction site for insertion of the heterologous gene or genes to be expressed; a wild type baculovirus with a sequence homologous to the baculovirus-specific fragment in the transfer vector (this allows for the homologous recombination of the heterologous gene in to the baculovirus genome); and appropriate insect host cells and growth media.

After inserting the DNA sequence encoding the protein into the transfer vector, the vector and the wild type viral genome are transfected into an insect host cell where the vector and viral genome are allowed to recombine. The packaged recombinant virus is expressed and recombinant plaques are identified and purified. Materials and methods for baculovirus/insect cell expression systems are commercially available in kit form from, *inter alia*, Invitrogen, San Diego CA ("MaxBac" kit). These techniques are generally known to those

skilled in the art and fully described in Summers and Smith, *Texas Agricultural Experiment Station Bulletin No. 1555* (1987) (hereinafter "Summers and Smith").

Prior to inserting the DNA sequence encoding the protein into the baculovirus genome, the above described components, comprising a promoter, leader (if desired), coding sequence of interest, and transcription termination sequence, are usually assembled into an intermediate transplacement construct (transfer vector). This construct may contain a single gene and operably linked regulatory elements; multiple genes, each with its owned set of operably linked regulatory elements; or multiple genes, regulated by the same set of regulatory elements. Intermediate transplacement constructs are often maintained in a replicon, such as an extrachromosomal element (*e.g.,* plasmids) capable of stable maintenance in a host, such as a bacterium. The replicon will have a replication system, thus allowing it to be maintained in a suitable host for cloning and amplification.

Currently, the most commonly used transfer vector for introducing foreign genes into AcNPV is pAc373. Many other vectors, known to those of skill in the art, have also been designed. These include, for example, pVL985 (which alters the polyhedrin start codon from ATG to ATT, and which introduces a BamH1 cloning site 32 basepairs downstream from the ATT; see Luckow and Summers, *Virology* (1989) *17*:31.

The plasmid usually also contains the polyhedrin polyadenylation signal (Miller et al. (1988) *Ann. Rev. Microbiol.*, *42*:177) and a prokaryotic ampicillin-resistance (*amp*) gene and origin of replication for selection and propagation in *E. coli*.

Baculovirus transfer vectors usually contain a baculovirus promoter. A baculovirus promoter is any DNA sequence capable of binding a baculovirus RNA polymerase and initiating the downstream (5' to 3') transcription of a coding sequence (*e.g.,* structural gene) into mRNA. A promoter will have a transcription initiation region which is usually placed proximal to the 5' end of the coding sequence. This transcription initiation region usually includes an RNA polymerase binding site and a transcription initiation site. A baculovirus transfer vector may also have a second domain called an enhancer, which, if present, is usually distal to the structural gene. Expression may be either regulated or constitutive.

Structural genes, abundantly transcribed at late times in a viral infection cycle, provide particularly useful promoter sequences. Examples include sequences derived from the gene encoding the viral polyhedron protein, Friesen et al., (1986) "The Regulation of Baculovirus Gene Expression," in: *The Molecular Biology of Baculoviruses* (ed. Walter Doerfler); EPO Publ. Nos. 127 839 and 155 476; and the gene encoding the p10 protein, Vlak et al., (1988), *J. Gen. Virol. 69*:765.

DNA encoding suitable signal sequences can be derived from genes for secreted insect or baculovirus proteins, such as the baculovirus polyhedrin gene (Carbonell et al. (1988) *Gene, 73*:409). Alternatively, since the signals for mammalian cell posttranslational modifications (such as signal peptide cleavage, proteolytic cleavage, and phosphorylation) appear to be recognized by insect cells, and the signals required for secretion and nuclear accumulation also appear to be conserved between the invertebrate cells and vertebrate cells, leaders of non-insect origin, such as those derived from genes encoding human □-interferon, Maeda et al., (1985), *Nature 315*:592; human gastrin-releasing peptide, Lebacq-Verheyden et al., (1988), *Molec. Cell. Biol. 8*:3129; human IL-2, Smith et al., (1985) *Proc. Nat'l Acad. Sci. USA, 82*:8404; mouse IL-3, (Miyajima et al.,

(1987) *Gene* 58:273; and human glucocerebrosidase, Martin et al. (1988) *DNA*, 7:99, can also be used to provide for secretion in insects.

A recombinant polypeptide or polyprotein may be expressed intracellularly or, if it is expressed with the proper regulatory sequences, it can be secreted. Good intracellular expression of nonfused foreign proteins usually requires heterologous genes that ideally have a short leader sequence containing suitable translation initiation signals preceding an ATG start signal. If desired, methionine at the N-terminus may be cleaved from the mature protein by *in vitro* incubation with cyanogen bromide.

Alternatively, recombinant polyproteins or proteins which are not naturally secreted can be secreted from the insect cell by creating chimeric DNA molecules that encode a fusion protein comprised of a leader sequence fragment that provides for secretion of the foreign protein in insects. The leader sequence fragment usually encodes a signal peptide comprised of hydrophobic amino acids which direct the translocation of the protein into the endoplasmic reticulum.

After insertion of the DNA sequence and/or the gene encoding the expression product precursor of the protein, an insect cell host is co-transformed with the heterologous DNA of the transfer vector and the genomic DNA of wild type baculovirus -- usually by co-transfection. The promoter and transcription termination sequence of the construct will usually comprise a 2-5kb section of the baculovirus genome. Methods for introducing heterologous DNA into the desired site in the baculovirus virus are known in the art. (See Summers and Smith *supra*; Ju et al. (1987); Smith et al., *Mol. Cell. Biol.* (1983) *3*:2156; and Luckow and Summers (1989)). For example, the insertion can be into a gene such as the polyhedrin gene, by homologous double crossover recombination; insertion can also be into a restriction enzyme site engineered into the desired baculovirus gene. Miller et al., (1989), *Bioessays* 4:91.The DNA sequence, when cloned in place of the polyhedrin gene in the expression vector, is flanked both 5' and 3' by polyhedrin-specific sequences and is positioned downstream of the polyhedrin promoter.

The newly formed baculovirus expression vector is subsequently packaged into an infectious recombinant baculovirus. Homologous recombination occurs at low frequency (between about 1% and about 5%); thus, the majority of the virus produced after cotransfection is still wild-type virus. Therefore, a method is necessary to identify recombinant viruses. An advantage of the expression system is a visual screen allowing recombinant viruses to be distinguished. The polyhedrin protein, which is produced by the native virus, is produced at very high levels in the nuclei of infected cells at late times after viral infection. Accumulated polyhedrin protein forms occlusion bodies that also contain embedded particles. These occlusion bodies, up to 15 □m in size, are highly refractile, giving them a bright shiny appearance that is readily visualized under the light microscope. Cells infected with recombinant viruses lack occlusion bodies. To distinguish recombinant virus from wild-type virus, the transfection supernatant is plaqued onto a monolayer of insect cells by techniques known to those skilled in the art. Namely, the plaques are screened under the light microscope for the presence (indicative of wild-type virus) or absence (indicative of recombinant virus) of occlusion bodies. "Current Protocols in Microbiology" Vol. 2 (Ausubel et al. eds) at 16.8 (Supp. 10, 1990); Summers and Smith, *supra*; Miller et al. (1989).

Recombinant baculovirus expression vectors have been developed for infection into several insect cells. For example, recombinant baculoviruses have been developed for, *inter alia*: *Aedes aegypti* , *Autographa californica*, *Bombyx mori*, *Drosophila melanogaster*, *Spodoptera frugiperda*, and *Trichoplusia ni* (WO 89/046699; Carbonell et al., (1985) *J. Virol. 56*:153; Wright (1986) *Nature 321*:718; Smith et al., (1983) *Mol. Cell. Biol. 3*:2156; and see generally, Fraser, *et al.* (1989) *In Vitro Cell. Dev. Biol. 25*:225).

Cells and cell culture media are commercially available for both direct and fusion expression of heterologous polypeptides in a baculovirus/expression system; cell culture technology is generally known to those skilled in the art. *See, e.g.*, Summers and Smith *supra*.

The modified insect cells may then be grown in an appropriate nutrient medium, which allows for stable maintenance of the plasmid(s) present in the modified insect host. Where the expression product gene is under inducible control, the host may be grown to high density, and expression induced. Alternatively, where expression is constitutive, the product will be continuously expressed into the medium and the nutrient medium must be continuously circulated, while removing the product of interest and augmenting depleted nutrients. The product may be purified by such techniques as chromatography, e.g., HPLC, affinity chromatography, ion exchange chromatography, etc.; electrophoresis; density gradient centrifugation; solvent extraction, or the like. As appropriate, the product may be further purified, as required, so as to remove substantially any insect proteins which are also secreted in the medium or result from lysis of insect cells, so as to provide a product which is at least substantially free of host debris, e.g., proteins, lipids and polysaccharides.

In order to obtain protein expression, recombinant host cells derived from the transformants are incubated under conditions which allow expression of the recombinant protein encoding sequence. These conditions will vary, dependent upon the host cell selected. However, the conditions are readily ascertainable to those of ordinary skill in the art, based upon what is known in the art.

iii. Plant Systems

There are many plant cell culture and whole plant genetic expression systems known in the art. Exemplary plant cellular genetic expression systems include those described in patents, such as: US 5,693,506; US 5,659,122; and US 5,608,143. Additional examples of genetic expression in plant cell culture has been described by Zenk, *Phytochemistry* 30:3861-3863 (1991). Descriptions of plant protein signal peptides may be found in addition to the references described above in Vaulcombe et al., *Mol. Gen. Genet.* 209:33-40 (1987); Chandler et al., *Plant Molecular Biology* 3:407-418 (1984); Rogers, *J. Biol. Chem.* 260:3731-3738 (1985); Rothstein et al., *Gene* 55:353-356 (1987); Whittier et al., Nucleic Acids Research 15:2515-2535 (1987); Wirsel et al., *Molecular Microbiology* 3:3-14 (1989); Yu et al., *Gene* 122:247-253 (1992). A description of the regulation of plant gene expression by the phytohormone, gibberellic acid and secreted enzymes induced by gibberellic acid can be found in R.L. Jones and J. MacMillin, Gibberellins: in: *Advanced Plant Physiology*,. Malcolm B. Wilkins, ed., 1984 Pitman Publishing Limited, London, pp. 21-52. References that describe other metabolically-regulated genes: Sheen, *Plant Cell*, 2:1027-1038(1990); Maas et al., *EMBO J.* 9:3447-3452 (1990); Benkel and Hickey, *Proc. Natl. Acad. Sci.* 84:1337-1339 (1987)

Typically, using techniques known in the art, a desired polynucleotide sequence is inserted into an expression cassette comprising genetic regulatory elements designed for operation in plants. The expression cassette is inserted into a desired expression vector with companion sequences upstream and downstream from the expression cassette suitable for expression in a plant host. The companion sequences will be of plasmid or viral origin and provide necessary characteristics to the vector to permit the vectors to move DNA from an original cloning host, such as bacteria, to the desired plant host. The basic bacterial/plant vector construct will preferably provide a broad host range prokaryote replication origin; a prokaryote selectable marker; and, for Agrobacterium transformations, T DNA sequences for Agrobacterium-mediated transfer to plant chromosomes. Where the heterologous gene is not readily amenable to detection, the construct will preferably also have a selectable marker gene suitable for determining if a plant cell has been transformed. A general review of suitable markers, for example for the members of the grass family, is found in Wilmink and Dons, 1993, *Plant Mol. Biol. Reptr*, 11(2):165-185.

Sequences suitable for permitting integration of the heterologous sequence into the plant genome are also recommended. These might include transposon sequences and the like for homologous recombination as well as Ti sequences which permit random insertion of a heterologous expression cassette into a plant genome. Suitable prokaryote selectable markers include resistance toward antibiotics such as ampicillin or tetracycline. Other DNA sequences encoding additional functions may also be present in the vector, as is known in the art.

The nucleic acid molecules of the subject invention may be included into an expression cassette for expression of the protein(s) of interest. Usually, there will be only one expression cassette, although two or more are feasible. The recombinant expression cassette will contain in addition to the heterologous protein encoding sequence the following elements, a promoter region, plant 5' untranslated sequences, initiation codon depending upon whether or not the structural gene comes equipped with one, and a transcription and translation termination sequence. Unique restriction enzyme sites at the 5' and 3' ends of the cassette allow for easy insertion into a pre-existing vector.

A heterologous coding sequence may be for any protein relating to the present invention. The sequence encoding the protein of interest will encode a signal peptide which allows processing and translocation of the protein, as appropriate, and will usually lack any sequence which might result in the binding of the desired protein of the invention to a membrane. Since, for the most part, the transcriptional initiation region will be for a gene which is expressed and translocated during germination, by employing the signal peptide which provides for translocation, one may also provide for translocation of the protein of interest. In this way, the protein(s) of interest will be translocated from the cells in which they are expressed and may be efficiently harvested. Typically secretion in seeds are across the aleurone or scutellar epithelium layer into the endosperm of the seed. While it is not required that the protein be secreted from the cells in which the protein is produced, this facilitates the isolation and purification of the recombinant protein.

Since the ultimate expression of the desired gene product will be in a eucaryotic cell it is desirable to determine whether any portion of the cloned gene contains sequences which will be processed out as introns by the host's splicosome machinery. If so, site-directed mutagenesis of the "intron" region may be conducted

to prevent losing a portion of the genetic message as a false intron code, Reed and Maniatis, *Cell* 41:95-105, 1985.

The vector can be microinjected directly into plant cells by use of micropipettes to mechanically transfer the recombinant DNA. Crossway, *Mol. Gen. Genet*, 202:179-185, 1985. The genetic material may also be transferred into the plant cell by using polyethylene glycol, Krens, et al., *Nature*, 296, 72-74, 1982. Another method of introduction of nucleic acid segments is high velocity ballistic penetration by small particles with the nucleic acid either within the matrix of small beads or particles, or on the surface, Klein, et al., *Nature*, 327, 70-73, 1987 and Knudsen and Muller, 1991, *Planta*, 185:330-336 teaching particle bombardment of barley endosperm to create transgenic barley. Yet another method of introduction would be fusion of protoplasts with other entities, either minicells, cells, lysosomes or other fusible lipid-surfaced bodies, Fraley, et al., *Proc. Natl. Acad. Sci. USA*, 79, 1859-1863, 1982.

The vector may also be introduced into the plant cells by electroporation. (Fromm et al., *Proc. Natl Acad. Sci. USA* 82:5824, 1985). In this technique, plant protoplasts are electroporated in the presence of plasmids containing the gene construct. Electrical impulses of high field strength reversibly permeabilize biomembranes allowing the introduction of the plasmids. Electroporated plant protoplasts reform the cell wall, divide, and form plant callus.

All plants from which protoplasts can be isolated and cultured to give whole regenerated plants can be transformed by the present invention so that whole plants are recovered which contain the transferred gene. It is known that practically all plants can be regenerated from cultured cells or tissues, including but not limited to all major species of sugarcane, sugar beet, cotton, fruit and other trees, legumes and vegetables. Some suitable plants include, for example, species from the genera *Fragaria*, *Lotus*, *Medicago*, *Onobrychis*, *Trifolium*, *Trigonella*, *Vigna*, *Citrus*, *Linum*, *Geranium*, *Manihot*, *Daucus*, *Arabidopsis*, *Brassica*, *Raphanus*, *Sinapis*, *Atropa*, *Capsicum*, *Datura*, *Hyoscyamus*, *Lycopersion*, *Nicotiana*, *Solanum*, *Petunia*, *Digitalis*, *Majorana*, *Cichorium*, *Helianthus*, *Lactuca*, *Bromus*, *Asparagus*, *Antirrhinum*, *Hererocallis*, *Nemesia*, *Pelargonium*, *Panicum*, *Pennisetum*, *Ranunculus*, *Senecio*, *Salpiglossis*, *Cucumis*, *Browaalia*, *Glycine*, *Lolium*, *Zea*, *Triticum*, *Sorghum*, and *Datura*.

Means for regeneration vary from species to species of plants, but generally a suspension of transformed protoplasts containing copies of the heterologous gene is first provided. Callus tissue is formed and shoots may be induced from callus and subsequently rooted. Alternatively, embryo formation can be induced from the protoplast suspension. These embryos germinate as natural embryos to form plants. The culture media will generally contain various amino acids and hormones, such as auxin and cytokinins. It is also advantageous to add glutamic acid and proline to the medium, especially for such species as corn and alfalfa. Shoots and roots normally develop simultaneously. Efficient regeneration will depend on the medium, on the genotype, and on the history of the culture. If these three variables are controlled, then regeneration is fully reproducible and repeatable.

In some plant cell culture systems, the desired protein of the invention may be excreted or alternatively, the protein may be extracted from the whole plant. Where the desired protein of the invention is secreted into the medium, it may be collected. Alternatively, the embryos and embryoless-half seeds or other plant tissue may

be mechanically disrupted to release any secreted protein between cells and tissues. The mixture may be suspended in a buffer solution to retrieve soluble proteins. Conventional protein isolation and purification methods will be then used to purify the recombinant protein. Parameters of time, temperature pH, oxygen, and volumes will be adjusted through routine methods to optimize expression and recovery of heterologous protein.

iv. Bacterial Systems

Bacterial expression techniques are known in the art. A bacterial promoter is any DNA sequence capable of binding bacterial RNA polymerase and initiating the downstream (3') transcription of a coding sequence (*e.g.*, structural gene) into mRNA. A promoter will have a transcription initiation region which is usually placed proximal to the 5' end of the coding sequence. This transcription initiation region usually includes an RNA polymerase binding site and a transcription initiation site. A bacterial promoter may also have a second domain called an operator, that may overlap an adjacent RNA polymerase binding site at which RNA synthesis begins. The operator permits negative regulated (inducible) transcription, as a gene repressor protein may bind the operator and thereby inhibit transcription of a specific gene. Constitutive expression may occur in the absence of negative regulatory elements, such as the operator. In addition, positive regulation may be achieved by a gene activator protein binding sequence, which, if present is usually proximal (5') to the RNA polymerase binding sequence. An example of a gene activator protein is the catabolite activator protein (CAP), which helps initiate transcription of the lac operon in Escherichia coli (E. coli) [Raibaud *et al.* (1984) *Annu. Rev. Genet. 18*:173]. Regulated expression may therefore be either positive or negative, thereby either enhancing or reducing transcription.

Sequences encoding metabolic pathway enzymes provide particularly useful promoter sequences. Examples include promoter sequences derived from sugar metabolizing enzymes, such as galactose, lactose (*lac*) [Chang *et al.* (1977) *Nature 198*:1056], and maltose. Additional examples include promoter sequences derived from biosynthetic enzymes such as tryptophan (*trp*) [Goeddel *et al.* (1980) *Nuc. Acids Res. 8*:4057; Yelverton *et al.* (1981) *Nucl. Acids Res. 9*:731; US patent 4,738,921; EP-A-0036776 and EP-A-0121775]. The g-laotamase (*bla*) promoter system [Weissmann (1981) "The cloning of interferon and other mistakes." In *Interferon 3* (ed. I. Gresser)], bacteriophage lambda PL [Shimatake *et al.* (1981) *Nature* 292:128] and T5 [US patent 4,689,406] promoter systems also provide useful promoter sequences.

In addition, synthetic promoters which do not occur in nature also function as bacterial promoters. For example, transcription activation sequences of one bacterial or bacteriophage promoter may be joined with the operon sequences of another bacterial or bacteriophage promoter, creating a synthetic hybrid promoter [US patent 4,551,433]. For example, the *tac* promoter is a hybrid *trp-lac* promoter comprised of both *trp* promoter and *lac* operon sequences that is regulated by the *lac* repressor [Amann *et al.* (1983) *Gene 25*:167; de Boer *et al.* (1983) *Proc. Natl. Acad. Sci. 80*:21]. Furthermore, a bacterial promoter can include naturally occurring promoters of non-bacterial origin that have the ability to bind bacterial RNA polymerase and initiate transcription. A naturally occurring promoter of non-bacterial origin can also be coupled with a compatible RNA polymerase to produce high levels of expression of some genes in prokaryotes. The bacteriophage T7 RNA polymerase/promoter system is an example of a coupled promoter system [Studier *et*

al. (1986) *J. Mol. Biol. 189*:113; Tabor *et al.* (1985) *Proc Natl. Acad. Sci. 82*:1074]. In addition, a hybrid promoter can also be comprised of a bacteriophage promoter and an *E. coli* operator region (EPO-A-0 267 851).

In addition to a functioning promoter sequence, an efficient ribosome binding site is also useful for the expression of foreign genes in prokaryotes. In *E. coli*, the ribosome binding site is called the Shine-Dalgarno (SD) sequence and includes an initiation codon (ATG) and a sequence 3-9 nucleotides in length located 3-11 nucleotides upstream of the initiation codon [Shine *et al.* (1975) *Nature 254*:34]. The SD sequence is thought to promote binding of mRNA to the ribosome by the pairing of bases between the SD sequence and the 3' and of *E. coli* 16S rRNA [Steitz *et al.* (1979) "Genetic signals and nucleotide sequences in messenger RNA." In *Biological Regulation and Development: Gene Expression* (ed. R.F. Goldberger)]. To express eukaryotic genes and prokaryotic genes with weak ribosome-binding site [Sambrook *et al.* (1989) "Expression of cloned genes in Escherichia coli." In *Molecular Cloning: A Laboratory Manual*].

A DNA molecule may be expressed intracellularly. A promoter sequence may be directly linked with the DNA molecule, in which case the first amino acid at the N-terminus will always be a methionine, which is encoded by the ATG start codon. If desired, methionine at the N-terminus may be cleaved from the protein by *in vitro* incubation with cyanogen bromide or by either *in vivo* on *in vitro* incubation with a bacterial methionine N-terminal peptidase (EPO-A-0 219 237).

Fusion proteins provide an alternative to direct expression. Usually, a DNA sequence encoding the N-terminal portion of an endogenous bacterial protein, or other stable protein, is fused to the 5' end of heterologous coding sequences. Upon expression, this construct will provide a fusion of the two amino acid sequences. For example, the bacteriophage lambda cell gene can be linked at the 5' terminus of a foreign gene and expressed in bacteria. The resulting fusion protein preferably retains a site for a processing enzyme (factor Xa) to cleave the bacteriophage protein from the foreign gene [Nagai *et al.* (1984) *Nature 309*:810]. Fusion proteins can also be made with sequences from the *lacZ* [Jia *et al.* (1987) *Gene 60*:197], *trpE* [Allen et al. (1987) J. Biotechnol. 5:93; Makoff *et al.* (1989) *J. Gen. Microbiol. 135*:11], and *Chey* [EP-A-0 324 647] genes. The DNA sequence at the junction of the two amino acid sequences may or may not encode a cleavable site. Another example is a ubiquitin fusion protein. Such a fusion protein is made with the ubiquitin region that preferably retains a site for a processing enzyme (*e.g.,* ubiquitin specific processing-protease) to cleave the ubiquitin from the foreign protein. Through this method, native foreign protein can be isolated [Miller *et al.* (1989) *Bio/Technology* 7:698].

Alternatively, foreign proteins can also be secreted from the cell by creating chimeric DNA molecules that encode a fusion protein comprised of a signal peptide sequence fragment that provides for secretion of the foreign protein in bacteria [US patent 4,336,336]. The signal sequence fragment usually encodes a signal peptide comprised of hydrophobic amino acids which direct the secretion of the protein from the cell. The protein is either secreted into the growth media (gram-positive bacteria) or into the periplasmic space, located between the inner and outer membrane of the cell (gram-negative bacteria). Preferably there are processing sites, which can be cleaved either *in vivo* or *in vitro* encoded between the signal peptide fragment and the foreign gene.

DNA encoding suitable signal sequences can be derived from genes for secreted bacterial proteins, such as the *E. coli* outer membrane protein gene (*ompA*) [Masui *et al.* (1983), in: *Experimental Manipulation of Gene Expression*; Ghrayeb *et al.* (1984) *EMBO J.* 3:2437] and the *E. coli* alkaline phosphatase signal sequence (*phoA*) [Oka *et al.* (1985) *Proc. Natl. Acad. Sci.* 82:7212]. As an additional example, the signal sequence of the alpha-amylase gene from various Bacillus strains can be used to secrete heterologous proteins from *B. subtilis* [Palva *et al.* (1982) *Proc. Natl. Acad. Sci. USA* 79:5582; EP-A-0 244 042].

Usually, transcription termination sequences recognized by bacteria are regulatory regions located 3' to the translation stop codon, and thus together with the promoter flank the coding sequence. These sequences direct the transcription of an mRNA which can be translated into the polypeptide encoded by the DNA. Transcription termination sequences frequently include DNA sequences of about 50 nucleotides capable of forming stem loop structures that aid in terminating transcription. Examples include transcription termination sequences derived from genes with strong promoters, such as the *trp* gene in *E. coli* as well as other biosynthetic genes.

Usually, the above described components, comprising a promoter, signal sequence (if desired), coding sequence of interest, and transcription termination sequence, are put together into expression constructs. Expression constructs are often maintained in a replicon, such as an extrachromosomal element (*e.g.*, plasmids) capable of stable maintenance in a host, such as bacteria. The replicon will have a replication system, thus allowing it to be maintained in a prokaryotic host either for expression or for cloning and amplification. In addition, a replicon may be either a high or low copy number plasmid. A high copy number plasmid will generally have a copy number ranging from about 5 to about 200, and usually about 10 to about 150. A host containing a high copy number plasmid will preferably contain at least about 10, and more preferably at least about 20 plasmids. Either a high or low copy number vector may be selected, depending upon the effect of the vector and the foreign protein on the host.

Alternatively, the expression constructs can be integrated into the bacterial genome with an integrating vector. Integrating vectors usually contain at least one sequence homologous to the bacterial chromosome that allows the vector to integrate. Integrations appear to result from recombinations between homologous DNA in the vector and the bacterial chromosome. For example, integrating vectors constructed with DNA from various Bacillus strains integrate into the Bacillus chromosome (EP-A- 0 127 328). Integrating vectors may also be comprised of bacteriophage or transposon sequences.

Usually, extrachromosomal and integrating expression constructs may contain selectable markers to allow for the selection of bacterial strains that have been transformed. Selectable markers can be expressed in the bacterial host and may include genes which render bacteria resistant to drugs such as ampicillin, chloramphenicol, erythromycin, kanamycin (neomycin), and tetracycline [Davies *et al.* (1978) *Annu. Rev. Microbiol.* 32:469]. Selectable markers may also include biosynthetic genes, such as those in the histidine, tryptophan, and leucine biosynthetic pathways.

Alternatively, some of the above described components can be put together in transformation vectors. Transformation vectors are usually comprised of a selectable market that is either maintained in a replicon or developed into an integrating vector, as described above.

Expression and transformation vectors, either extra-chromosomal replicons or integrating vectors, have been developed for transformation into many bacteria. For example, expression vectors have been developed for, *inter alia*, the following bacteria: Bacillus subtilis [Palva *et al.* (1982) *Proc. Natl. Acad. Sci. USA 79*:5582; EP-A-0 036 259 and EP-A-0 063 953; WO 84/04541], Escherichia coli [Shimatake *et al.* (1981) *Nature 292*:128; Amann *et al.* (1985) *Gene 40*:183; Studier *et al.* (1986) *J. Mol. Biol. 189*:113; EP-A-0 036 776,EP-A-0 136 829 and EP-A-0 136 907], Streptococcus cremoris [Powell *et al.* (1988) *Appl. Environ. Microbiol. 54*:655]; Streptococcus lividans [Powell *et al.* (1988) *Appl. Environ. Microbiol. 54*:655], Streptomyces lividans [US patent 4,745,056].

Methods of introducing exogenous DNA into bacterial hosts are well-known in the art, and usually include either the transformation of bacteria treated with $CaCl_2$ or other agents, such as divalent cations and DMSO. DNA can also be introduced into bacterial cells by electroporation. Transformation procedures usually vary with the bacterial species to be transformed. See *e.g.*, [Masson *et al.* (1989) *FEMS Microbiol. Lett. 60*:273; Palva *et al.* (1982) *Proc. Natl. Acad. Sci. USA 79*:5582; EP-A-0 036 259 and EP-A-0 063 953; WO 84/04541, Bacillus], [Miller *et al.* (1988) *Proc. Natl. Acad. Sci. 85*:856; Wang *et al.* (1990) *J. Bacteriol. 172*:949, Campylobacter], [Cohen *et al.* (1973) *Proc. Natl. Acad. Sci. 69*:2110; Dower *et al.* (1988) *Nucleic Acids Res. 16*:6127; Kushner (1978) "An improved method for transformation of Escherichia coli with ColE1-derived plasmids. In *Genetic Engineering: Proceedings of the International Symposium on Genetic Engineering* (eds. H.W. Boyer and S. Nicosia); Mandel *et al.* (1970) *J. Mol. Biol. 53*:159; Taketo (1988) *Biochim. Biophys. Acta 949*:318; Escherichia], [Chassy *et al.* (1987) *FEMS Microbiol. Lett. 44*:173 Lactobacillus]; [Fiedler *et al.* (1988) *Anal. Biochem 170*:38, Pseudomonas]; [Augustin *et al.* (1990) *FEMS Microbiol. Lett. 66*:203, Staphylococcus], [Barany *et al.* (1980) *J. Bacteriol. 144*:698; Harlander (1987) "Transformation of Streptococcus lactis by electroporation, in: *Streptococcal Genetics* (ed. J. Ferretti and R. Curtiss III); Perry *et al.* (1981) *Infect. Immun. 32*:1295; Powell *et al.* (1988) *Appl. Environ. Microbiol. 54*:655; Somkuti *et al.* (1987) *Proc. 4th Evr. Cong. Biotechnology 1*:412, Streptococcus].

v. Yeast Expression

Yeast expression systems are also known to one of ordinary skill in the art. A yeast promoter is any DNA sequence capable of binding yeast RNA polymerase and initiating the downstream (3') transcription of a coding sequence (*e.g.*, structural gene) into mRNA. A promoter will have a transcription initiation region which is usually placed proximal to the 5' end of the coding sequence. This transcription initiation region usually includes an RNA polymerase binding site (the "TATA Box") and a transcription initiation site. A yeast promoter may also have a second domain called an upstream activator sequence (UAS), which, if present, is usually distal to the structural gene. The UAS permits regulated (inducible) expression. Constitutive expression occurs in the absence of a UAS. Regulated expression may be either positive or negative, thereby either enhancing or reducing transcription.

Yeast is a fermenting organism with an active metabolic pathway, therefore sequences encoding enzymes in the metabolic pathway provide particularly useful promoter sequences. Examples include alcohol dehydrogenase (ADH) (EP-A-0 284 044), enolase, glucokinase, glucose-6-phosphate isomerase, glyceraldehyde-3-phosphate-dehydrogenase (GAP or GAPDH), hexokinase, phosphofructokinase, 3-

phosphoglycerate mutase, and pyruvate kinase (PyK) (EPO-A-0 329 203). The yeast *PHO5* gene, encoding acid phosphatase, also provides useful promoter sequences [Myanohara *et al.* (1983) *Proc. Natl. Acad. Sci. USA 80*:1].

In addition, synthetic promoters which do not occur in nature also function as yeast promoters. For example, UAS sequences of one yeast promoter may be joined with the transcription activation region of another yeast promoter, creating a synthetic hybrid promoter. Examples of such hybrid promoters include the ADH regulatory sequence linked to the GAP transcription activation region (US Patent Nos. 4,876,197 and 4,880,734). Other examples of hybrid promoters include promoters which consist of the regulatory sequences of either the *ADH2, GAL4, GAL10,* OR *PHO5* genes, combined with the transcriptional activation region of a glycolytic enzyme gene such as GAP or PyK (EP-A-0 164 556). Furthermore, a yeast promoter can include naturally occurring promoters of non-yeast origin that have the ability to bind yeast RNA polymerase and initiate transcription. Examples of such promoters include, *inter alia,* [Cohen *et al.* (1980) *Proc. Natl. Acad. Sci. USA 77*:1078; Henikoff *et al.* (1981) *Nature 283*:835; Hollenberg *et al.* (1981) *Curr. Topics Microbiol. Immunol. 96*:119; Hollenberg *et al.* (1979) "The Expression of Bacterial Antibiotic Resistance Genes in the Yeast Saccharomyces cerevisiae," in: *Plasmids of Medical, Environmental and Commercial Importance* (eds. K.N. Timmis and A. Puhler); Mercerau-Puigalon *et al.* (1980) *Gene 11*:163; Panthier *et al.* (1980) *Curr. Genet.* 2:109;].

A DNA molecule may be expressed intracellularly in yeast. A promoter sequence may be directly linked with the DNA molecule, in which case the first amino acid at the N-terminus of the recombinant protein will always be a methionine, which is encoded by the ATG start codon. If desired, methionine at the N-terminus may be cleaved from the protein by *in vitro* incubation with cyanogen bromide.

Fusion proteins provide an alternative for yeast expression systems, as well as in mammalian, baculovirus, and bacterial expression systems. Usually, a DNA sequence encoding the N-terminal portion of an endogenous yeast protein, or other stable protein, is fused to the 5' end of heterologous coding sequences. Upon expression, this construct will provide a fusion of the two amino acid sequences. For example, the yeast or human superoxide dismutase (SOD) gene, can be linked at the 5' terminus of a foreign gene and expressed in yeast. The DNA sequence at the junction of the two amino acid sequences may or may not encode a cleavable site. See *e.g.,* EP-A-0 196 056. Another example is a ubiquitin fusion protein. Such a fusion protein is made with the ubiquitin region that preferably retains a site for a processing enzyme (*e.g.,* ubiquitin-specific processing protease) to cleave the ubiquitin from the foreign protein. Through this method, therefore, native foreign protein can be isolated (*e.g.,* WO88/024066).

Alternatively, foreign proteins can also be secreted from the cell into the growth media by creating chimeric DNA molecules that encode a fusion protein comprised of a leader sequence fragment that provide for secretion in yeast of the foreign protein. Preferably, there are processing sites encoded between the leader fragment and the foreign gene that can be cleaved either *in vivo* or *in vitro.* The leader sequence fragment usually encodes a signal peptide comprised of hydrophobic amino acids which direct the secretion of the protein from the cell.

DNA encoding suitable signal sequences can be derived from genes for secreted yeast proteins, such as the yeast invertase gene (EP-A-0 012 873; JPO. 62,096,086) and the A-factor gene (US patent 4,588,684). Alternatively, leaders of non-yeast origin, such as an interferon leader, exist that also provide for secretion in yeast (EP-A-0 060 057).

A preferred class of secretion leaders are those that employ a fragment of the yeast alpha-factor gene, which contains both a "pre" signal sequence, and a "pro" region. The types of alpha-factor fragments that can be employed include the full-length pre-pro alpha factor leader (about 83 amino acid residues) as well as truncated alpha-factor leaders (usually about 25 to about 50 amino acid residues) (US Patents 4,546,083 and 4,870,008; EP-A-0 324 274). Additional leaders employing an alpha-factor leader fragment that provides for secretion include hybrid alpha-factor leaders made with a presequence of a first yeast, but a pro-region from a second yeast alphafactor. (*e.g.*, see WO 89/02463.)

Usually, transcription termination sequences recognized by yeast are regulatory regions located 3' to the translation stop codon, and thus together with the promoter flank the coding sequence. These sequences direct the transcription of an mRNA which can be translated into the polypeptide encoded by the DNA. Examples of transcription terminator sequence and other yeast-recognized termination sequences, such as those coding for glycolytic enzymes.

Usually, the above described components, comprising a promoter, leader (if desired), coding sequence of interest, and transcription termination sequence, are put together into expression constructs. Expression constructs are often maintained in a replicon, such as an extrachromosomal element (*e.g.*, plasmids) capable of stable maintenance in a host, such as yeast or bacteria. The replicon may have two replication systems, thus allowing it to be maintained, for example, in yeast for expression and in a prokaryotic host for cloning and amplification. Examples of such yeast-bacteria shuttle vectors include YEp24 [Botstein *et al.* (1979) *Gene* 8:17-24], pCl/1 [Brake *et al.* (1984) *PNAS USA 81*:4642-4646], and YRp17 [Stinchcomb *et al.* (1982) *J. Mol. Biol. 158*:157]. In addition, a replicon may be either a high or low copy number plasmid. A high copy number plasmid will generally have a copy number ranging from about 5 to about 200, and usually about 10 to about 150. A host containing a high copy number plasmid will preferably have at least about 10, and more preferably at least about 20. Enter a high or low copy number vector may be selected, depending upon the effect of the vector and the foreign protein on the host. See *e.g.*, Brake *et al.*, *supra*.

Alternatively, the expression constructs can be integrated into the yeast genome with an integrating vector. Integrating vectors usually contain at least one sequence homologous to a yeast chromosome that allows the vector to integrate, and preferably contain two homologous sequences flanking the expression construct. Integrations appear to result from recombinations between homologous DNA in the vector and the yeast chromosome [Orr-Weaver *et al.* (1983) *Methods in Enzymol. 101*:228-245]. An integrating vector may be directed to a specific locus in yeast by selecting the appropriate homologous sequence for inclusion in the vector. See Orr-Weaver *et al.*, *supra*. One or more expression construct may integrate, possibly affecting levels of recombinant protein produced [Rine *et al.* (1983) *Proc. Natl. Acad. Sci. USA 80*:6750]. The chromosomal sequences included in the vector can occur either as a single segment in the vector, which results in the integration of the entire vector, or two segments homologous to adjacent segments in the

chromosome and flanking the expression construct in the vector, which can result in the stable integration of only the expression construct.

Usually, extrachromosomal and integrating expression constructs may contain selectable markers to allow for the selection of yeast strains that have been transformed. Selectable markers may include biosynthetic genes that can be expressed in the yeast host, such as *ADE2*, *HIS4*, *LEU2*, *TRP1*, and *ALG7*, and the G418 resistance gene, which confer resistance in yeast cells to tunicamycin and G418, respectively. In addition, a suitable selectable marker may also provide yeast with the ability to grow in the presence of toxic compounds, such as metal. For example, the presence of *CUP1* allows yeast to grow in the presence of copper ions [Butt *et al.* (1987) *Microbiol, Rev. 51*:351].

Alternatively, some of the above described components can be put together into transformation vectors. Transformation vectors are usually comprised of a selectable marker that is either maintained in a replicon or developed into an integrating vector, as described above.

Expression and transformation vectors, either extrachromosomal replicons or integrating vectors, have been developed for transformation into many yeasts. For example, expression vectors have been developed for, *inter alia*, the following yeasts:Candida albicans [Kurtz, *et al.* (1986) *Mol. Cell. Biol. 6*:142], Candida maltosa [Kunze, *et al.* (1985) *J. Basic Microbiol. 25*:141]. Hansenula polymorpha [Gleeson, *et al.* (1986) *J. Gen. Microbiol. 132*:3459; Roggenkamp *et al.* (1986) *Mol. Gen. Genet. 202*:302], Kluyveromyces fragilis [Das, *et al.* (1984) *J. Bacteriol. 158*:1165], Kluyveromyces lactis [De Louvencourt *et al.* (1983) *J. Bacteriol. 154*:737; Van den Berg *et al.* (1990) *Bio/Technology 8*:135], Pichia guillerimondii [Kunze *et al.* (1985) *J. Basic Microbiol. 25*:141], Pichia pastoris [Cregg, *et al.* (1985) *Mol. Cell. Biol. 5*:3376; US Patent Nos. 4,837,148 and 4,929,555], Saccharomyces cerevisiae [Hinnen *et al.* (1978) *Proc. Natl. Acad. Sci. USA 75*:1929; Ito *et al.* (1983) *J. Bacteriol. 153*:163], Schizosaccharomyces pombe [Beach and Nurse (1981) *Nature 300*:706], and Yarrowia lipolytica [Davidow, *et al.* (1985) *Curr. Genet. 10*:380471 Gaillardin, *et al.* (1985) *Curr. Genet. 10*:49].

Methods of introducing exogenous DNA into yeast hosts are well-known in the art, and usually include either the transformation of spheroplasts or of intact yeast cells treated with alkali cations. Transformation procedures usually vary with the yeast species to be transformed. See *e.g.*, [Kurtz *et al.* (1986) *Mol. Cell. Biol. 6*:142; Kunze *et al.* (1985) *J. Basic Microbiol. 25*:141; Candida]; [Gleeson *et al.* (1986) *J. Gen. Microbiol. 132*:3459; Roggenkamp *et al.* (1986) *Mol. Gen. Genet. 202*:302; Hansenula]; [Das *et al.* (1984) *J. Bacteriol. 158*:1165; De Louvencourt *et al.* (1983) *J. Bacteriol. 154*:1165; Van den Berg *et al.* (1990) *Bio/Technology 8*:135; Kluyveromyces]; [Cregg *et al.* (1985) *Mol. Cell. Biol. 5*:3376; Kunze *et al.* (1985) *J. Basic Microbiol. 25*:141; US Patent Nos. 4,837,148 and 4,929,555; Pichia]; [Hinnen *et al.* (1978) *Proc. Natl. Acad. Sci. USA 75*;1929; Ito *et al.* (1983) *J. Bacteriol. 153*:163 Saccharomyces]; [Beach and Nurse (1981) *Nature 300*:706; Schizosaccharomyces]; [Davidow *et al.* (1985) *Curr. Genet. 10*:39; Gaillardin *et al.* (1985) *Curr. Genet. 10*:49; Yarrowia].

Antibodies

As used herein, the term "antibody" refers to a polypeptide or group of polypeptides composed of at least one antibody combining site. An "antibody combining site" is the three-dimensional binding space with an

internal surface shape and charge distribution complementary to the features of an epitope of an antigen, which allows a binding of the antibody with the antigen. "Antibody" includes, for example, vertebrate antibodies, hybrid antibodies, chimeric antibodies, humanised antibodies, altered antibodies, univalent antibodies, Fab proteins, and single domain antibodies.

Antibodies against the proteins of the invention are useful for affinity chromatography, immunoassays, and distinguishing/identifying meningococcal proteins.

Antibodies to the proteins of the invention, both polyclonal and monoclonal, may be prepared by conventional methods. In general, the protein is first used to immunize a suitable animal, preferably a mouse, rat, rabbit or goat. Rabbits and goats are preferred for the preparation of polyclonal sera due to the volume of serum obtainable, and the availability of labeled anti-rabbit and anti-goat antibodies. Immunization is generally performed by mixing or emulsifying the protein in saline, preferably in an adjuvant such as Freund's complete adjuvant, and injecting the mixture or emulsion parenterally (generally subcutaneously or intramuscularly). A dose of 50-200 □g/injection is typically sufficient. Immunization is generally boosted 2-6 weeks later with one or more injections of the protein in saline, preferably using Freund's incomplete adjuvant. One may alternatively generate antibodies by in vitro immunization using methods known in the art, which for the purposes of this invention is considered equivalent to *in vivo* immunization. Polyclonal antisera is obtained by bleeding the immunized animal into a glass or plastic container, incubating the blood at 25□C for one hour, followed by incubating at 4□C for 2-18 hours. The serum is recovered by centrifugation (*e.g.*, 1,000*g* for 10 minutes). About 20-50 ml per bleed may be obtained from rabbits.

Monoclonal antibodies are prepared using the standard method of Kohler & Milstein [*Nature* (1975) 256:495-96], or a modification thereof. Typically, a mouse or rat is immunized as described above. However, rather than bleeding the animal to extract serum, the spleen (and optionally several large lymph nodes) is removed and dissociated into single cells. If desired, the spleen cells may be screened (after removal of nonspecifically adherent cells) by applying a cell suspension to a plate or well coated with the protein antigen. B-cells expressing membrane-bound immunoglobulin specific for the antigen bind to the plate, and are not rinsed away with the rest of the suspension. Resulting B-cells, or all dissociated spleen cells, are then induced to fuse with myeloma cells to form hybridomas, and are cultured in a selective medium (*e.g.*, hypoxanthine, aminopterin, thymidine medium, "HAT"). The resulting hybridomas are plated by limiting dilution, and are assayed for the production of antibodies which bind specifically to the immunizing antigen (and which do not bind to unrelated antigens). The selected MAb-secreting hybridomas are then cultured either *in vitro* (*e.g.*, in tissue culture bottles or hollow fiber reactors), or *in vivo* (as ascites in mice).

If desired, the antibodies (whether polyclonal or monoclonal) may be labeled using conventional techniques. Suitable labels include fluorophores, chromophores, radioactive atoms (particularly ^{32}P and ^{125}I), electron-dense reagents, enzymes, and ligands having specific binding partners. Enzymes are typically detected by their activity. For example, horseradish peroxidase is usually detected by its ability to convert 3,3',5,5'-tetramethylbenzidine (TMB) to a blue pigment, quantifiable with a spectrophotometer. "Specific binding partner" refers to a protein capable of binding a ligand molecule with high specificity, as for example in the case of an antigen and a monoclonal antibody specific therefor. Other specific binding partners include

biotin and avidin or streptavidin, IgG and protein A, and the numerous receptor-ligand couples known in the art. It should be understood that the above description is not meant to categorize the various labels into distinct classes, as the same label may serve in several different modes. For example, ^{125}I may serve as a radioactive label or as an electron-dense reagent. HRP may serve as enzyme or as antigen for a MAb. Further, one may combine various labels for desired effect. For example, MAbs and avidin also require labels in the practice of this invention: thus, one might label a MAb with biotin, and detect its presence with avidin labeled with ^{125}I, or with an anti-biotin MAb labeled with HRP. Other permutations and possibilities will be readily apparent to those of ordinary skill in the art, and are considered as equivalents within the scope of the invention.

Pharmaceutical Compositions

Pharmaceutical compositions can comprise either polypeptides, antibodies, or nucleic acid of the invention. The pharmaceutical compositions will comprise a therapeutically effective amount of either polypeptides, antibodies, or polynucleotides of the claimed invention.

The term "therapeutically effective amount" as used herein refers to an amount of a therapeutic agent to treat, ameliorate, or prevent a desired disease or condition, or to exhibit a detectable therapeutic or preventative effect. The effect can be detected by, for example, chemical markers or antigen levels. Therapeutic effects also include reduction in physical symptoms, such as decreased body temperature. The precise effective amount for a subject will depend upon the subject's size and health, the nature and extent of the condition, and the therapeutics or combination of therapeutics selected for administration. Thus, it is not useful to specify an exact effective amount in advance. However, the effective amount for a given situation can be determined by routine experimentation and is within the judgement of the clinician.

For purposes of the present invention, an effective dose will be from about 0.01 mg/ kg to 50 mg/kg or 0.05 mg/kg to about 10 mg/kg of the DNA constructs in the individual to which it is administered.

A pharmaceutical composition can also contain a pharmaceutically acceptable carrier. The term "pharmaceutically acceptable carrier" refers to a carrier for administration of a therapeutic agent, such as antibodies or a polypeptide, genes, and other therapeutic agents. The term refers to any pharmaceutical carrier that does not itself induce the production of antibodies harmful to the individual receiving the composition, and which may be administered without undue toxicity. Suitable carriers may be large, slowly metabolized macromolecules such as proteins, polysaccharides, polylactic acids, polyglycolic acids, polymeric amino acids, amino acid copolymers, and inactive virus particles. Such carriers are well known to those of ordinary skill in the art.

Pharmaceutically acceptable salts can be used therein, for example, mineral acid salts such as hydrochlorides, hydrobromides, phosphates, sulfates, and the like; and the salts of organic acids such as acetates, propionates, malonates, benzoates, and the like. A thorough discussion of pharmaceutically acceptable excipients is available in Remington's Pharmaceutical Sciences (Mack Pub. Co., N.J. 1991).

Pharmaceutically acceptable carriers in therapeutic compositions may contain liquids such as water, saline, glycerol and ethanol. Additionally, auxiliary substances, such as wetting or emulsifying agents, pH buffering

substances, and the like, may be present in such vehicles. Typically, the therapeutic compositions are prepared as injectables, either as liquid solutions or suspensions; solid forms suitable for solution in, or suspension in, liquid vehicles prior to injection may also be prepared. Liposomes are included within the definition of a pharmaceutically acceptable carrier.

Delivery Methods

Once formulated, the compositions of the invention can be administered directly to the subject. The subjects to be treated can be animals; in particular, human subjects can be treated.

Direct delivery of the compositions will generally be accomplished by injection, either subcutaneously, intraperitoneally, intravenously or intramuscularly or delivered to the interstitial space of a tissue. The compositions can also be administered into a lesion. Other modes of administration include oral and pulmonary administration, suppositories, and transdermal or transcutaneous applications (*e.g.*, see WO98/20734), needles, and gene guns or hyposprays. Dosage treatment may be a single dose schedule or a multiple dose schedule.

Vaccines

Vaccines according to the invention may either be prophylactic (*i.e.*, to prevent infection) or therapeutic (*i.e.*, to treat disease after infection).

Such vaccines comprise immunising antigen(s), immunogen(s), polypeptide(s), protein(s) or nucleic acid, usually in combination with "pharmaceutically acceptable carriers," which include any carrier that does not itself induce the production of antibodies harmful to the individual receiving the composition. Suitable carriers are typically large, slowly metabolized macromolecules such as proteins, polysaccharides, polylactic acids, polyglycolic acids, polymeric amino acids, amino acid copolymers, lipid aggregates (such as oil droplets or liposomes), and inactive virus particles. Such carriers are well known to those of ordinary skill in the art. Additionally, these carriers may function as immunostimulating agents ("adjuvants"). Furthermore, the antigen or immunogen may be conjugated to a bacterial toxoid, such as a toxoid from diphtheria, tetanus, cholera, *H. pylori*, *etc.* pathogens.

Preferred adjuvants to enhance effectiveness of the composition include, but are not limited to: (1) aluminum salts (alum), such as aluminum hydroxide, aluminum phosphate, aluminum sulfate, etc; (2) oil-in-water emulsion formulations (with or without other specific immunostimulating agents such as muramyl peptides (see below) or bacterial cell wall components), such as for example (a) MF59™ (WO 90/14837; Chapter 10 in *Vaccine design: the subunit and adjuvant approach*, eds. Powell & Newman, Plenum Press 1995), containing 5% Squalene, 0.5% Tween 80, and 0.5% Span 85 (optionally containing various amounts of MTP-PE (see below), although not required) formulated into submicron particles using a microfluidizer such as Model 110Y microfluidizer (Microfluidics, Newton, MA), (b) SAF, containing 10% Squalane, 0.4% Tween 80, 5% pluronic-blocked polymer L121, and thr-MDP (see below) either microfluidized into a submicron emulsion or vortexed to generate a larger particle size emulsion, and (c) Ribi™ adjuvant system (RAS), (Ribi Immunochem, Hamilton, MT) containing 2% Squalene, 0.2% Tween 80, and one or more bacterial cell wall components from the group consisting of monophosphorylipid A (MPL), trehalose

dimycolate (TDM), and cell wall skeleton (CWS), preferably MPL + CWS (Detox™); (3) saponin adjuvants, such as Stimulon™ (Cambridge Bioscience, Worcester, MA) may be used or particles generated therefrom such as ISCOMs (immunostimulating complexes); (4) Complete Freund's Adjuvant (CFA) and Incomplete Freund's Adjuvant (IFA); (5) cytokines, such as interleukins (*e.g.*, IL-1, IL-2, IL-4, IL-5, IL-6, IL-7, IL-12, *etc.*), interferons (*e.g.*, gamma interferon), macrophage colony stimulating factor (M-CSF), tumor necrosis factor (TNF), etc; and (6) other substances that act as immunostimulating agents to enhance the effectiveness of the composition. Alum and MF59™ are preferred.

As mentioned above, muramyl peptides include, but are not limited to, N-acetyl-muramyl-L-threonyl-D-isoglutamine (thr-MDP), N-acetyl-normuramyl-L-alanyl-D-isoglutamine (nor-MDP), N-acetylmuramyl-L-alanyl-D-isoglutaminyl-L-alanine-2-(1'-2'-dipalmitoyl-*sn*-glycero-3-hydroxyphosphoryloxy)-ethylamine (MTP-PE), *etc.*

The immunogenic compositions (*e.g.*, the immunising antigen/immunogen/polypeptide/protein/ nucleic acid, pharmaceutically acceptable carrier, and adjuvant) typically will contain diluents, such as water, saline, glycerol, ethanol, etc. Additionally, auxiliary substances, such as wetting or emulsifying agents, pH buffering substances, and the like, may be present in such vehicles.

Typically, the immunogenic compositions are prepared as injectables, either as liquid solutions or suspensions; solid forms suitable for solution in, or suspension in, liquid vehicles prior to injection may also be prepared. The preparation also may be emulsified or encapsulated in liposomes for enhanced adjuvant effect, as discussed above under pharmaceutically acceptable carriers.

Immunogenic compositions used as vaccines comprise an immunologically effective amount of the antigenic or immunogenic polypeptides, as well as any other of the above-mentioned components, as needed. By "immunologically effective amount", it is meant that the administration of that amount to an individual, either in a single dose or as part of a series, is effective for treatment or prevention. This amount varies depending upon the health and physical condition of the individual to be treated, the taxonomic group of individual to be treated (*e.g.*, nonhuman primate, primate, *etc.*), the capacity of the individual's immune system to synthesize antibodies, the degree of protection desired, the formulation of the vaccine, the treating doctor's assessment of the medical situation, and other relevant factors. It is expected that the amount will fall in a relatively broad range that can be determined through routine trials.

The immunogenic compositions are conventionally administered parenterally, *e.g.*, by injection, either subcutaneously, intramuscularly, or transdermally/transcutaneously (*e.g.*, WO98/20734). Additional formulations suitable for other modes of administration include oral and pulmonary formulations, suppositories, and transdermal applications. Dosage treatment may be a single dose schedule or a multiple dose schedule. The vaccine may be administered in conjunction with other immunoregulatory agents.

As an alternative to protein-based vaccines, DNA vaccination may be employed [*e.g.*, Robinson & Torres (1997) *Seminars in Immunology* 9:271-283; Donnelly *et al.* (1997) *Annu Rev Immunol* 15:617-648; see later herein].

Gene Delivery Vehicles

Gene therapy vehicles for delivery of constructs including a coding sequence of a therapeutic of the invention, to be delivered to the mammal for expression in the mammal, can be administered either locally or systemically. These constructs can utilize viral or non-viral vector approaches in *in vivo* or *ex vivo* modality. Expression of such coding sequence can be induced using endogenous mammalian or heterologous promoters. Expression of the coding sequence in vivo can be either constitutive or regulated.

The invention includes gene delivery vehicles capable of expressing the contemplated nucleic acid sequences. The gene delivery vehicle is preferably a viral vector and, more preferably, a retroviral, adenoviral, adeno-associated viral (AAV), herpes viral, or alphavirus vector. The viral vector can also be an astrovirus, coronavirus, orthomyxovirus, papovavirus, paramyxovirus, parvovirus, picornavirus, poxvirus, or togavirus viral vector. See generally, Jolly (1994) *Cancer Gene Therapy* 1:51-64; Kimura (1994) *Human Gene Therapy* 5:845-852; Connelly (1995) *Human Gene Therapy* 6:185-193; and Kaplitt (1994) *Nature Genetics* 6:148-153.

Retroviral vectors are well known in the art and we contemplate that any retroviral gene therapy vector is employable in the invention, including B, C and D type retroviruses, xenotropic retroviruses (for example, NZB-X1, NZB-X2 and NZB9-1 (see O'Neill (1985) *J. Virol.* 53:160) polytropic retroviruses *e.g.*, MCF and MCF-MLV (see Kelly (1983) *J. Virol.* 45:291), spumaviruses and lentiviruses. See RNA Tumor Viruses, Second Edition, Cold Spring Harbor Laboratory, 1985.

Portions of the retroviral gene therapy vector may be derived from different retroviruses. For example, retrovector LTRs may be derived from a Murine Sarcoma Virus, a tRNA binding site from a Rous Sarcoma Virus, a packaging signal from a Murine Leukemia Virus, and an origin of second strand synthesis from an Avian Leukosis Virus.

These recombinant retroviral vectors may be used to generate transduction competent retroviral vector particles by introducing them into appropriate packaging cell lines (see US patent 5,591,624). Retrovirus vectors can be constructed for site-specific integration into host cell DNA by incorporation of a chimeric integrase enzyme into the retroviral particle (see WO96/37626). It is preferable that the recombinant viral vector is a replication defective recombinant virus.

Packaging cell lines suitable for use with the above-described retrovirus vectors are well known in the art, are readily prepared (see WO95/30763 and WO92/05266), and can be used to create producer cell lines (also termed vector cell lines or "VCLs") for the production of recombinant vector particles. Preferably, the packaging cell lines are made from human parent cells (*e.g.*, HT1080 cells) or mink parent cell lines, which eliminates inactivation in human serum.

Preferred retroviruses for the construction of retroviral gene therapy vectors include Avian Leukosis Virus, Bovine Leukemia, Virus, Murine Leukemia Virus, Mink-Cell Focus-Inducing Virus, Murine Sarcoma Virus, Reticuloendotheliosis Virus and Rous Sarcoma Virus. Particularly preferred Murine Leukemia Viruses include 4070A and 1504A (Hartley and Rowe (1976) *J Virol* 19:19-25), Abelson (ATCC No. VR-999), Friend (ATCC No. VR-245), Graffi, Gross (ATCC Nol VR-590), Kirsten, Harvey Sarcoma Virus and Rauscher (ATCC No. VR-998) and Moloney Murine Leukemia Virus (ATCC No. VR-190). Such

retroviruses may be obtained from depositories or collections such as the American Type Culture Collection ("ATCC") in Rockville, Maryland or isolated from known sources using commonly available techniques.

Exemplary known retroviral gene therapy vectors employable in this invention include those described in patent applications GB2200651, EP0415731, EP0345242, EP0334301, WO89/02468; WO89/05349, WO89/09271, WO90/02806, WO90/07936, WO94/03622, WO93/25698, WO93/25234, WO93/11230, WO93/10218, WO91/02805, WO91/02825, WO95/07994, US 5,219,740, US 4,405,712, US 4,861,719, US 4,980,289, US 4,777,127, US 5,591,624. See also Vile (1993) *Cancer Res* 53:3860-3864; Vile (1993) *Cancer Res* 53:962-967; Ram (1993) *Cancer Res* 53 (1993) 83-88; Takamiya (1992) *J Neurosci Res* 33:493-503; Baba (1993) *J Neurosurg* 79:729-735; Mann (1983) *Cell* 33:153; Cane (1984) *Proc Natl Acad Sci* 81:6349; and Miller (1990) *Human Gene Therapy* 1.

Human adenoviral gene therapy vectors are also known in the art and employable in this invention. See, for example, Berkner (1988) *Biotechniques* 6:616 and Rosenfeld (1991) *Science* 252:431, and WO93/07283, WO93/06223, and WO93/07282. Exemplary known adenoviral gene therapy vectors employable in this invention include those described in the above referenced documents and in WO94/12649, WO93/03769, WO93/19191, WO94/28938, WO95/11984, WO95/00655, WO95/27071, WO95/29993, WO95/34671, WO96/05320, WO94/08026, WO94/11506, WO93/06223, WO94/24299, WO95/14102, WO95/24297, WO95/02697, WO94/28152, WO94/24299, WO95/09241, WO95/25807, WO95/05835, WO94/18922 and WO95/09654. Alternatively, administration of DNA linked to killed adenovirus as described in Curiel (1992) *Hum. Gene Ther.* 3:147-154 may be employed. The gene delivery vehicles of the invention also include adenovirus associated virus (AAV) vectors. Leading and preferred examples of such vectors for use in this invention are the AAV-2 based vectors disclosed in Srivastava, WO93/09239. Most preferred AAV vectors comprise the two AAV inverted terminal repeats in which the native D-sequences are modified by substitution of nucleotides, such that at least 5 native nucleotides and up to 18 native nucleotides, preferably at least 10 native nucleotides up to 18 native nucleotides, most preferably 10 native nucleotides are retained and the remaining nucleotides of the D-sequence are deleted or replaced with non-native nucleotides. The native D-sequences of the AAV inverted terminal repeats are sequences of 20 consecutive nucleotides in each AAV inverted terminal repeat (*i.e.,* there is one sequence at each end) which are not involved in HP formation. The non-native replacement nucleotide may be any nucleotide other than the nucleotide found in the native D-sequence in the same position. Other employable exemplary AAV vectors are pWP-19, pWN-1, both of which are disclosed in Nahreini (1993) *Gene* 124:257-262. Another example of such an AAV vector is psub201 (see Samulski (1987) *J. Virol.* 61:3096). Another exemplary AAV vector is the Double-D ITR vector. Construction of the Double-D ITR vector is disclosed in US Patent 5,478,745. Still other vectors are those disclosed in Carter US Patent 4,797,368 and Muzyczka US Patent 5,139,941, Chartejee US Patent 5,474,935, and Kotin WO94/288157. Yet a further example of an AAV vector employable in this invention is SSV9AFABTKneo, which contains the AFP enhancer and albumin promoter and directs expression predominantly in the liver. Its structure and construction are disclosed in Su (1996) *Human Gene Therapy* 7:463-470. Additional AAV gene therapy vectors are described in US 5,354,678, US 5,173,414, US 5,139,941, and US 5,252,479.

The gene therapy vectors of the invention also include herpes vectors. Leading and preferred examples are herpes simplex virus vectors containing a sequence encoding a thymidine kinase polypeptide such as those disclosed in US 5,288,641 and EP0176170 (Roizman). Additional exemplary herpes simplex virus vectors include HFEM/ICP6-LacZ disclosed in WO95/04139 (Wistar Institute), pHSVlac described in Geller (1988) *Science* 241:1667-1669 and in WO90/09441 and WO92/07945, HSV Us3::pgC-lacZ described in Fink (1992) *Human Gene Therapy* 3:11-19 and HSV 7134, 2 RH 105 and GAL4 described in EP 0453242 (Breakefield), and those deposited with the ATCC as accession numbers ATCC VR-977 and ATCC VR-260.

Also contemplated are alpha virus gene therapy vectors that can be employed in this invention. Preferred alpha virus vectors are Sindbis viruses vectors. Togaviruses, Semliki Forest virus (ATCC VR-67; ATCC VR-1247), Middleberg virus (ATCC VR-370), Ross River virus (ATCC VR-373; ATCC VR-1246), Venezuelan equine encephalitis virus (ATCC VR923; ATCC VR-1250; ATCC VR-1249; ATCC VR-532), and those described in US patents 5,091,309, 5,217,879, and WO92/10578. More particularly, those alpha virus vectors described in US Serial No. 08/405,627, filed March 15, 1995,WO94/21792, WO92/10578, WO95/07994, US 5,091,309 and US 5,217,879 are employable. Such alpha viruses may be obtained from depositories or collections such as the ATCC in Rockville, Maryland or isolated from known sources using commonly available techniques. Preferably, alphavirus vectors with reduced cytotoxicity are used (see USSN 08/679640).

DNA vector systems such as eukaryotic layered expression systems are also useful for expressing the nucleic acids of the invention. See WO95/07994 for a detailed description of eukaryotic layered expression systems. Preferably, the eukaryotic layered expression systems of the invention are derived from alphavirus vectors and most preferably from Sindbis viral vectors.

Other viral vectors suitable for use in the present invention include those derived from poliovirus, for example ATCC VR-58 and those described in Evans, Nature 339 (1989) 385 and Sabin (1973) *J. Biol. Standardization* 1:115; rhinovirus, for example ATCC VR-1110 and those described in Arnold (1990) *J Cell Biochem* L401; pox viruses such as canary pox virus or vaccinia virus, for example ATCC VR-111 and ATCC VR-2010 and those described in Fisher-Hoch (1989) *Proc Natl Acad Sci* 86:317; Flexner (1989) *Ann NY Acad Sci* 569:86, Flexner (1990) *Vaccine* 8:17; in US 4,603,112 and US 4,769,330 and WO89/01973; SV40 virus, for example ATCC VR-305 and those described in Mulligan (1979) *Nature* 277:108 and Madzak (1992) *J Gen Virol* 73:1533; influenza virus, for example ATCC VR-797 and recombinant influenza viruses made employing reverse genetics techniques as described in US 5,166,057 and in Enami (1990) *Proc Natl Acad Sci* 87:3802-3805; Enami & Palese (1991) *J Virol* 65:2711-2713 and Luytjes (1989) *Cell* 59:110, (see also McMichael (1983) *NEJ Med* 309:13, and Yap (1978) *Nature* 273:238 and *Nature* (1979) 277:108); human immunodeficiency virus as described in EP-0386882 and in Buchschacher (1992) *J. Virol.* 66:2731; measles virus, for example ATCC VR-67 and VR-1247 and those described in EP-0440219; Aura virus, for example ATCC VR-368; Bebaru virus, for example ATCC VR-600 and ATCC VR-1240; Cabassou virus, for example ATCC VR-922; Chikungunya virus, for example ATCC VR-64 and ATCC VR-1241; Fort Morgan Virus, for example ATCC VR-924; Getah virus, for example ATCC VR-369 and ATCC VR-1243; Kyzylagach virus, for example ATCC VR-927; Mayaro virus, for example ATCC VR-66; Mucambo virus, for example ATCC

VR-580 and ATCC VR-1244; Ndumu virus, for example ATCC VR-371; Pixuna virus, for example ATCC VR-372 and ATCC VR-1245; Tonate virus, for example ATCC VR-925; Triniti virus, for example ATCC VR-469; Una virus, for example ATCC VR-374; Whataroa virus, for example ATCC VR-926; Y-62-33 virus, for example ATCC VR-375; O'Nyong virus, Eastern encephalitis virus, for example ATCC VR-65 and ATCC VR-1242; Western encephalitis virus, for example ATCC VR-70, ATCC VR-1251, ATCC VR-622 and ATCC VR-1252; and coronavirus, for example ATCC VR-740 and those described in Hamre (1966) *Proc Soc Exp Biol Med* 121:190.

Delivery of the compositions of this invention into cells is not limited to the above mentioned viral vectors. Other delivery methods and media may be employed such as, for example, nucleic acid expression vectors, polycationic condensed DNA linked or unlinked to killed adenovirus alone, for example see US Serial No. 08/366,787, filed December 30, 1994 and Curiel (1992) *Hum Gene Ther* 3:147-154 ligand linked DNA, for example see Wu (1989) *J Biol Chem* 264:16985-16987, eucaryotic cell delivery vehicles cells, for example see US Serial No.08/240,030, filed May 9, 1994, and US Serial No. 08/404,796, deposition of photopolymerized hydrogel materials, hand-held gene transfer particle gun, as described in US Patent 5,149,655, ionizing radiation as described in US5,206,152 and in WO92/11033, nucleic charge neutralization or fusion with cell membranes. Additional approaches are described in Philip (1994) *Mol Cell Biol* 14:2411-2418 and in Woffendin (1994) *Proc Natl Acad Sci* 91:1581-1585.

Particle mediated gene transfer may be employed, for example see US Serial No. 60/023,867. Briefly, the sequence can be inserted into conventional vectors that contain conventional control sequences for high level expression, and then incubated with synthetic gene transfer molecules such as polymeric DNA-binding cations like polylysine, protamine, and albumin, linked to cell targeting ligands such as asialoorosomucoid, as described in Wu & Wu (1987) *J. Biol. Chem.* 262:4429-4432, insulin as described in Hucked (1990) *Biochem Pharmacol* 40:253-263, galactose as described in Plank (1992) *Bioconjugate Chem* 3:533-539, lactose or transferrin.

Naked DNA may also be employed. Exemplary naked DNA introduction methods are described in WO 90/11092 and US 5,580,859. Uptake efficiency may be improved using biodegradable latex beads. DNA coated latex beads are efficiently transported into cells after endocytosis initiation by the beads. The method may be improved further by treatment of the beads to increase hydrophobicity and thereby facilitate disruption of the endosome and release of the DNA into the cytoplasm.

Liposomes that can act as gene delivery vehicles are described in US 5,422,120, WO95/13796, WO94/23697, WO91/14445 and EP-524,968. As described in USSN. 60/023,867, on non-viral delivery, the nucleic acid sequences encoding a polypeptide can be inserted into conventional vectors that contain conventional control sequences for high level expression, and then be incubated with synthetic gene transfer molecules such as polymeric DNA-binding cations like polylysine, protamine, and albumin, linked to cell targeting ligands such as asialoorosomucoid, insulin, galactose, lactose, or transferrin. Other delivery systems include the use of liposomes to encapsulate DNA comprising the gene under the control of a variety of tissue-specific or ubiquitously-active promoters. Further non-viral delivery suitable for use includes mechanical delivery systems such as the approach described in Woffendin *et al* (1994) *Proc. Natl. Acad. Sci. USA*

91(24):11581-11585. Moreover, the coding sequence and the product of expression of such can be delivered through deposition of photopolymerized hydrogel materials. Other conventional methods for gene delivery that can be used for delivery of the coding sequence include, for example, use of hand-held gene transfer particle gun, as described in US 5,149,655; use of ionizing radiation for activating transferred gene, as described in US 5,206,152 and WO92/11033

Exemplary liposome and polycationic gene delivery vehicles are those described in US 5,422,120 and 4,762,915; in WO 95/13796; WO94/23697; and WO91/14445; in EP-0524968; and in Stryer, Biochemistry, pages 236-240 (1975) W.H. Freeman, San Francisco; Szoka (1980) *Biochem Biophys Acta* 600:1; Bayer (1979) *Biochem Biophys Acta* 550:464; Rivnay (1987) *Meth Enzymol* 149:119; Wang (1987) *Proc Natl Acad Sci* 84:7851; Plant (1989) *Anal Biochem* 176:420.

A polynucleotide composition can comprises therapeutically effective amount of a gene therapy vehicle, as the term is defined above. For purposes of the present invention, an effective dose will be from about 0.01 mg/ kg to 50 mg/kg or 0.05 mg/kg to about 10 mg/kg of the DNA constructs in the individual to which it is administered.

Delivery Methods

Once formulated, the polynucleotide compositions of the invention can be administered (1) directly to the subject; (2) delivered *ex vivo*, to cells derived from the subject; or (3) *in vitro* for expression of recombinant proteins. The subjects to be treated can be mammals or birds. Also, human subjects can be treated.

Direct delivery of the compositions will generally be accomplished by injection, either subcutaneously, intraperitoneally, intravenously or intramuscularly or delivered to the interstitial space of a tissue. The compositions can also be administered into a lesion. Other modes of administration include oral and pulmonary administration, suppositories, and transdermal or transcutaneous applications (*e.g.,* see WO98/20734), needles, and gene guns or hyposprays. Dosage treatment may be a single dose schedule or a multiple dose schedule.

Methods for the *ex vivo* delivery and reimplantation of transformed cells into a subject are known in the art and described in *e.g.,* WO93/14778. Examples of cells useful in ex vivo applications include, for example, stem cells, particularly hematopoetic, lymph cells, macrophages, dendritic cells, or tumor cells.

Generally, delivery of nucleic acids for both *ex vivo* and *in vitro* applications can be accomplished by the following procedures, for example, dextran-mediated transfection, calcium phosphate precipitation, polybrene mediated transfection, protoplast fusion, electroporation, encapsulation of the polynucleotide(s) in liposomes, and direct microinjection of the DNA into nuclei, all well known in the art.

Polynucleotide and polypeptide pharmaceutical compositions

In addition to the pharmaceutically acceptable carriers and salts described above, the following additional agents can be used with polynucleotide and/or polypeptide compositions.

A.Polypeptides

One example are polypeptides which include, without limitation: asioloorosomucoid (ASOR); transferrin; asialoglycoproteins; antibodies; antibody fragments; ferritin; interleukins; interferons, granulocyte,

macrophage colony stimulating factor (GM-CSF), granulocyte colony stimulating factor (G-CSF), macrophage colony stimulating factor (M-CSF), stem cell factor and erythropoietin. Viral antigens, such as envelope proteins, can also be used. Also, proteins from other invasive organisms, such as the 17 amino acid peptide from the circumsporozoite protein of plasmodium falciparum known as RII.

B.Hormones, Vitamins, *etc.*

Other groups that can be included are, for example: hormones, steroids, androgens, estrogens, thyroid hormone, or vitamins, folic acid.

C.Polyalkylenes, Polysaccharides, *etc.*

Also, polyalkylene glycol can be included with the desired polynucleotides/polypeptides. In a preferred embodiment, the polyalkylene glycol is polyethlylene glycol. In addition, mono-, di-, or polysaccharides can be included. In a preferred embodiment of this aspect, the polysaccharide is dextran or DEAE-dextran. Also, chitosan and poly(lactide-co-glycolide)

D.Lipids, and Liposomes

The desired polynucleotide/polypeptide can also be encapsulated in lipids or packaged in liposomes prior to delivery to the subject or to cells derived therefrom.

Lipid encapsulation is generally accomplished using liposomes which are able to stably bind or entrap and retain nucleic acid. The ratio of condensed polynucleotide to lipid preparation can vary but will generally be around 1:1 (mg DNA:micromoles lipid), or more of lipid. For a review of the use of liposomes as carriers for delivery of nucleic acids, see, Hug and Sleight (1991) *Biochim. Biophys. Acta.* 1097:1-17; Straubinger (1983) *Meth. Enzymol.* 101:512-527.

Liposomal preparations for use in the present invention include cationic (positively charged), anionic (negatively charged) and neutral preparations. Cationic liposomes have been shown to mediate intracellular delivery of plasmid DNA (Felgner (1987) *Proc. Natl. Acad. Sci. USA* 84:7413-7416); mRNA (Malone (1989) *Proc. Natl. Acad. Sci. USA* 86:6077-6081); and purified transcription factors (Debs (1990) *J. Biol. Chem.* 265:10189-10192), in functional form.

Cationic liposomes are readily available. For example, N[1-2,3-dioleyloxy)propyl]-N,N,N-triethylammonium (DOTMA) liposomes are available under the trademark Lipofectin, from GIBCO BRL, Grand Island, NY. (See, also, Felgner *supra*). Other commercially available liposomes include transfectace (DDAB/DOPE) and DOTAP/DOPE (Boerhinger). Other cationic liposomes can be prepared from readily available materials using techniques well known in the art. See, *e.g.*, Szoka (1978) *Proc. Natl. Acad. Sci. USA* 75:4194-4198; WO90/11092 for a description of the synthesis of DOTAP (1,2-bis(oleoyloxy)-3-(trimethylammonio)propane) liposomes.

Similarly, anionic and neutral liposomes are readily available, such as from Avanti Polar Lipids (Birmingham, AL), or can be easily prepared using readily available materials. Such materials include phosphatidyl choline, cholesterol, phosphatidyl ethanolamine, dioleoylphosphatidyl choline (DOPC), dioleoylphosphatidyl glycerol (DOPG), dioleoylphoshatidyl ethanolamine (DOPE), among others. These

materials can also be mixed with the DOTMA and DOTAP starting materials in appropriate ratios. Methods for making liposomes using these materials are well known in the art.

The liposomes can comprise multilammelar vesicles (MLVs), small unilamellar vesicles (SUVs), or large unilamellar vesicles (LUVs). The various liposome-nucleic acid complexes are prepared using methods known in the art. See *e.g.*, Straubinger (1983) *Meth. Immunol.* 101:512-527; Szoka (1978) *Proc. Natl. Acad. Sci. USA* 75:4194-4198; Papahadjopoulos (1975) *Biochim. Biophys. Acta* 394:483; Wilson (1979) *Cell* 17:77); Deamer & Bangham (1976) *Biochim. Biophys. Acta* 443:629; Ostro (1977) *Biochem. Biophys. Res. Commun.* 76:836; Fraley (1979) *Proc. Natl. Acad. Sci. USA* 76:3348); Enoch & Strittmatter (1979) *Proc. Natl. Acad. Sci. USA* 76:145; Fraley (1980) *J. Biol. Chem.* (1980) 255:10431; Szoka & Papahadjopoulos (1978) *Proc. Natl. Acad. Sci. USA* 75:145; and Schaefer-Ridder (1982) *Science* 215:166.

E.Lipoproteins

In addition, lipoproteins can be included with the polynucleotide/polypeptide to be delivered. Examples of lipoproteins to be utilized include: chylomicrons, HDL, IDL, LDL, and VLDL. Mutants, fragments, or fusions of these proteins can also be used. Also, modifications of naturally occurring lipoproteins can be used, such as acetylated LDL. These lipoproteins can target the delivery of polynucleotides to cells expressing lipoprotein receptors. Preferably, if lipoproteins are including with the polynucleotide to be delivered, no other targeting ligand is included in the composition.

Naturally occurring lipoproteins comprise a lipid and a protein portion. The protein portion are known as apoproteins. At the present, apoproteins A, B, C, D, and E have been isolated and identified. At least two of these contain several proteins, designated by Roman numerals, AI, AII, AIV; CI, CII, CIII.

A lipoprotein can comprise more than one apoprotein. For example, naturally occurring chylomicrons comprises of A, B, C, and E, over time these lipoproteins lose A and acquire C and E apoproteins. VLDL comprises A, B, C, and E apoproteins, LDL comprises apoprotein B; and HDL comprises apoproteins A, C, and E.

The amino acid of these apoproteins are known and are described in, for example, Breslow (1985) Annu Rev. Biochem 54:699; Law (1986) Adv. Exp Med. Biol. 151:162; Chen (1986) J Biol Chem 261:12918; Kane (1980) Proc Natl Acad Sci USA 77:2465; and Utermann (1984) Hum Genet 65:232.

Lipoproteins contain a variety of lipids including, triglycerides, cholesterol (free and esters), and phospholipids. The composition of the lipids varies in naturally occurring lipoproteins. For example, chylomicrons comprise mainly triglycerides. A more detailed description of the lipid content of naturally occurring lipoproteins can be found, for example, in *Meth. Enzymol.* 128 (1986). The composition of the lipids are chosen to aid in conformation of the apoprotein for receptor binding activity. The composition of lipids can also be chosen to facilitate hydrophobic interaction and association with the polynucleotide binding molecule.

Naturally occurring lipoproteins can be isolated from serum by ultracentrifugation, for instance. Such methods are described in *Meth. Enzymol.* (*supra*); Pitas (1980) *J. Biochem.* 255:5454-5460 and Mahey (1979) *J Clin. Invest* 64:743-750. Lipoproteins can also be produced by *in vitro* or recombinant methods by

expression of the apoprotein genes in a desired host cell. See, for example, Atkinson (1986) *Annu Rev Biophys Chem* 15:403 and Radding (1958) *Biochim Biophys Acta* 30: 443. Lipoproteins can also be purchased from commercial suppliers, such as Biomedical Techniologies, Inc., Stoughton, Massachusetts, USA. Further description of lipoproteins can be found in Zuckermann *et al.* WO98/06437..

F.Polycationic Agents

Polycationic agents can be included, with or without lipoprotein, in a composition with the desired polynucleotide/polypeptide to be delivered.

Polycationic agents, typically, exhibit a net positive charge at physiological relevant pH and are capable of neutralizing the electrical charge of nucleic acids to facilitate delivery to a desired location. These agents have both in vitro, ex vivo, and in vivo applications. Polycationic agents can be used to deliver nucleic acids to a living subject either intramuscularly, subcutaneously, etc.

The following are examples of useful polypeptides as polycationic agents: polylysine, polyarginine, polyornithine, and protamine. Other examples include histones, protamines, human serum albumin, DNA binding proteins, non-histone chromosomal proteins, coat proteins from DNA viruses, such as (X174, transcriptional factors also contain domains that bind DNA and therefore may be useful as nucleic aid condensing agents. Briefly, transcriptional factors such as C/CEBP, c-jun, c-fos, AP-1, AP-2, AP-3, CPF, Prot-1, Sp-1, Oct-1, Oct-2, CREP, and TFIID contain basic domains that bind DNA sequences.

Organic polycationic agents include: spermine, spermidine, and purtrescine.

The dimensions and of the physical properties of a polycationic agent can be extrapolated from the list above, to construct other polypeptide polycationic agents or to produce synthetic polycationic agents.

Synthetic polycationic agents which are useful include, for example, DEAE-dextran, polybrene. Lipofectin□, and lipofectAMINE□ are monomers that form polycationic complexes when combined with polynucleotides/polypeptides.

Immunodiagnostic Assays

Meningogoccal antigens of the invention can be used in immunoassays to detcct antibody levels (or, conversely, anti-meningococcal antibodies can be used to detect antigen levels). Immunoassays based on well defined, recombinant antigens can be developed to replace invasive diagnostics methods. Antibodies to meningococcal proteins within biological samples, including for example, blood or serum samples, can be detected. Design of the immunoassays is subject to a great deal of variation, and a variety of these are known in the art. Protocols for the immunoassay may be based, for example, upon competition, or direct reaction, or sandwich type assays. Protocols may also, for example, use solid supports, or may be by immunoprecipitation. Most assays involve the use of labeled antibody or polypeptide; the labels may be, for example, fluorescent, chemiluminescent, radioactive, or dye molecules. Assays which amplify the signals from the probe are also known; examples of which are assays which utilize biotin and avidin, and enzyme-labeled and mediated immunoassays, such as ELISA assays.

Kits suitable for immunodiagnosis and containing the appropriate labeled reagents are constructed by packaging the appropriate materials, including the compositions of the invention, in suitable containers, along

with the remaining reagents and materials (for example, suitable buffers, salt solutions, *etc.*) required for the conduct of the assay, as well as suitable set of assay instructions.

Nucleic Acid Hybridisation

"Hybridization" refers to the association of two nucleic acid sequences to one another by hydrogen bonding. Typically, one sequence will be fixed to a solid support and the other will be free in solution. Then, the two sequences will be placed in contact with one another under conditions that favor hydrogen bonding. Factors that affect this bonding include: the type and volume of solvent; reaction temperature; time of hybridization; agitation; agents to block the non-specific attachment of the liquid phase sequence to the solid support (Denhardt's reagent or BLOTTO); concentration of the sequences; use of compounds to increase the rate of association of sequences (dextran sulfate or polyethylene glycol); and the stringency of the washing conditions following hybridization. See Sambrook *et al.* [*supra*] Volume 2, chapter 9, pages 9.47 to 9.57.

"Stringency" refers to conditions in a hybridization reaction that favor association of very similar sequences over sequences that differ. For example, the combination of temperature and salt concentration should be chosen that is approximately 120 to 200□C below the calculated Tm of the hybrid under study. The temperature and salt conditions can often be determined empirically in preliminary experiments in which samples of genomic DNA immobilized on filters are hybridized to the sequence of interest and then washed under conditions of different stringencies. See Sambrook *et al.* at page 9.50.

Variables to consider when performing, for example, a Southern blot are (1) the complexity of the DNA being blotted and (2) the homology between the probe and the sequences being detected. The total amount of the fragment(s) to be studied can vary a magnitude of 10, from 0.1 to 1μg for a plasmid or phage digest to 10^{-9} to 10^{-8} g for a single copy gene in a highly complex eukaryotic genome. For lower complexity polynucleotides, substantially shorter blotting, hybridization, and exposure times, a smaller amount of starting polynucleotides, and lower specific activity of probes can be used. For example, a single-copy yeast gene can be detected with an exposure time of only 1 hour starting with 1 μg of yeast DNA, blotting for two hours, and hybridizing for 4-8 hours with a probe of 10^8 cpm/μg. For a single-copy mammalian gene a conservative approach would start with 10 μg of DNA, blot overnight, and hybridize overnight in the presence of 10% dextran sulfate using a probe of greater than 10^8 cpm/μg, resulting in an exposure time of ~24 hours.

Several factors can affect the melting temperature (Tm) of a DNA-DNA hybrid between the probe and the fragment of interest, and consequently, the appropriate conditions for hybridization and washing. In many cases the probe is not 100% homologous to the fragment. Other commonly encountered variables include the length and total G+C content of the hybridizing sequences and the ionic strength and formamide content of the hybridization buffer. The effects of all of these factors can be approximated by a single equation:

$$Tm = 81 + 16.6(\log_{10}Ci) + 0.4[\%(G + C)] - 0.6(\%\text{formamide}) - 600/n - 1.5(\%\text{mismatch}).$$

where Ci is the salt concentration (monovalent ions) and n is the length of the hybrid in base pairs (slightly modified from Meinkoth & Wahl (1984) *Anal. Biochem.* 138: 267-284).

In designing a hybridization experiment, some factors affecting nucleic acid hybridization can be conveniently altered. The temperature of the hybridization and washes and the salt concentration during the

washes are the simplest to adjust. As the temperature of the hybridization increases (*i.e.*, stringency), it becomes less likely for hybridization to occur between strands that are nonhomologous, and as a result, background decreases. If the radiolabeled probe is not completely homologous with the immobilized fragment (as is frequently the case in gene family and interspecies hybridization experiments), the hybridization temperature must be reduced, and background will increase. The temperature of the washes affects the intensity of the hybridizing band and the degree of background in a similar manner. The stringency of the washes is also increased with decreasing salt concentrations.

In general, convenient hybridization temperatures in the presence of 50% formamide are 42□C for a probe with is 95% to 100% homologous to the target fragment, 37□C for 90% to 95% homology, and 32□C for 85% to 90% homology. For lower homologies, formamide content should be lowered and temperature adjusted accordingly, using the equation above. If the homology between the probe and the target fragment are not known, the simplest approach is to start with both hybridization and wash conditions which are nonstringent. If non-specific bands or high background are observed after autoradiography, the filter can be washed at high stringency and reexposed. If the time required for exposure makes this approach impractical, several hybridization and/or washing stringencies should be tested in parallel.

Nucleic Acid Probe Assays

Methods such as PCR, branched DNA probe assays, or blotting techniques utilizing nucleic acid probes according to the invention can determine the presence of cDNA or mRNA. A probe is said to "hybridize" with a sequence of the invention if it can form a duplex or double stranded complex, which is stable enough to be detected.

The nucleic acid probes will hybridize to the meningococcal nucleotide sequences of the invention (including both sense and antisense strands). Though many different nucleotide sequences will encode the amino acid sequence, the native meningococcal sequence is preferred because it is the actual sequence present in cells. mRNA represents a coding sequence and so a probe should be complementary to the coding sequence; single-stranded cDNA is complementary to mRNA, and so a cDNA probe should be complementary to the non-coding sequence.

The probe sequence need not be identical to the meningococcal sequence (or its complement) — some variation in the sequence and length can lead to increased assay sensitivity if the nucleic acid probe can form a duplex with target nucleotides, which can be detected. Also, the nucleic acid probe can include additional nucleotides to stabilize the formed duplex. Additional meningococcal sequence may also be helpful as a label to detect the formed duplex. For example, a non-complementary nucleotide sequence may be attached to the 5' end of the probe, with the remainder of the probe sequence being complementary to a meningococcal sequence. Alternatively, non-complementary bases or longer sequences can be interspersed into the probe, provided that the probe sequence has sufficient complementarity with the a meningococcal sequence in order to hybridize therewith and thereby form a duplex which can be detected.

The exact length and sequence of the probe will depend on the hybridization conditions, such as temperature, salt condition and the like. For example, for diagnostic applications, depending on the complexity of the analyte sequence, the nucleic acid probe typically contains at least 10-20 nucleotides, preferably 15-25, and

more preferably at least 30 nucleotides, although it may be shorter than this. Short primers generally require cooler temperatures to form sufficiently stable hybrid complexes with the template.

Probes may be produced by synthetic procedures, such as the triester method of Matteucci *et al.* [*J. Am. Chem. Soc.* (1981) 103:3185], or according to Urdea *et al.* [*Proc. Natl. Acad. Sci. USA* (1983) 80: 7461], or using commercially available automated oligonucleotide synthesizers.

The chemical nature of the probe can be selected according to preference. For certain applications, DNA or RNA are appropriate. For other applications, modifications may be incorporated *e.g.*, backbone modifications, such as phosphorothioates or methylphosphonates, can be used to increase *in vivo* half-life, alter RNA affinity, increase nuclease resistance *etc.* [*e.g.*, see Agrawal & Iyer (1995) *Curr Opin Biotechnol* 6:12-19; Agrawal (1996) *TIBTECH* 14:376-387]; analogues such as peptide nucleic acids may also be used [*e.g.*, see Corey (1997) *TIBTECH* 15:224-229; Buchardt *et al.* (1993) *TIBTECH* 11:384-386].

Alternatively, the polymerase chain reaction (PCR) is another well-known means for detecting small amounts of target nucleic acids. The assay is described in: Mullis *et al.* [*Meth. Enzymol.* (1987) 155: 335-350]; US patents 4,683,195 and 4,683,202. Two "primer" nucleotides hybridize with the target nucleic acids and are used to prime the reaction. The primers can comprise sequence that does not hybridize to the sequence of the amplification target (or its complement) to aid with duplex stability or, for example, to incorporate a convenient restriction site. Typically, such sequence will flank the desired meningococcal sequence.

A thermostable polymerase creates copies of target nucleic acids from the primers using the original target nucleic acids as a template. After a threshold amount of target nucleic acids are generated by the polymerase, they can be detected by more traditional methods, such as Southern blots. When using the Southern blot method, the labelled probe will hybridize to the meningococcal sequence (or its complement).

Also, mRNA or cDNA can be detected by traditional blotting techniques described in Sambrook *et al* [*supra*]. mRNA, or cDNA generated from mRNA using a polymerase enzyme, can be purified and separated using gel electrophoresis. The nucleic acids on the gel are then blotted onto a solid support, such as nitrocellulose. The solid support is exposed to a labelled probe and then washed to remove any unhybridized probe. Next, the duplexes containing the labeled probe are detected. Typically, the probe is labelled with a radioactive moiety.

MODES FOR CARRYING OUT THE INVENTION – PREFERRED FRAGMENTS

The protein sequences disclosed in the International Applications have been, *inter alia*, subjected to computer analysis to predict antigenic peptide fragments within the full-length proteins. Three algorithms have been used in this analysis:

- **AMPHI** This program has been used to predict T-cell epitopes [Gao *et al.* (1989) *J. Immunol.* 143:3007; Roberts *et al.* (1996) *AIDS Res Hum Retrovir* 12:593; Quakyi *et al.* (1992) *Scand J Immunol* suppl.11:9] and is available in the Protean package of DNASTAR, Inc. (1228 South Park Street, Madison, Wisconsin 53715 USA).

- **ANTIGENIC INDEX** as disclosed by Jameson & Wolf (1988) The antigenic index: a novel algorithm for predicting antigenic determinants. CABIOS, 4:181:186
- **HYDROPHILICITY** as disclosed by Hopp & Woods (1981) Prediction of protein antigenic determinants from amino acid sequences. PNAS, 78:3824-3828

The three algorithms often identify the same fragments. Such multiply-identified fragments are particularly preferred. The algorithms often identify overlapping fragments (*e.g.,* for antigen "013", AMPHI identifies aa 42-46, and Antigenic Index identifies aa 39-45). The invention explicitly includes fragments resulting from a combination of these overlapping fragments (*e.g.,* the fragment from residue 39 to residue 46, in the case of "013"). Fragments separated by a single amino acid are also often identified (*e.g.,* for "018-2", antigenic index identifies aa 19-23 and 25-41). The invention also includes fragments spanning the two extremes of such "adjacent" fragments (*e.g.,* 19-41 for "081-2"). The Example provides preferred antigenic fragments of the proteins disclosed in the International Applications.

Example 1 – Preferred Antigenic Protein Fragments

The following amino acid sequences in Table 1 are identified by titles indicating the number assigned to the particular open reading frame (ORF), consistent with those designated in the International Applications. The titles are of the following form: [no prefix, g, or a] [#], where "no prefix" means a sequence from *N. meningitidis* serotype B, "a" means a sequence from *N. meningitidis* serotype A, and "g" means a sequence from *N. gonorrhoeae*; and "#" means the number assigned to that open reading frame (ORF). For example, "127" refers to an *N.meningitidis B* amino acid sequence, ORF number 127. The presence of a suffix "-1" or "-2" to these titles indicates an additional sequence found for that particular ORF. Thus, for example, "a12-2" refers to an *N. meningitidis A* amino acid sequence, ORF number 12, which is another sequence found for ORF 12 in addition to the originally designated ORF 12 and ORF 12-1. Each amino acid sequence is preceded by the beginning amino acid position number and followed by the ending amino acid position number.

Table 1

012-1
AMPHI Regions - AMPHI
19-LysLeuLeuGluGlnLeuMetArgPheLeuGlnPheLeuSerGluPheLeuPheAlaLeuPheArgIle-41
48-ArgAlaLeuLysPheAlaArgArg-55
90-AsnPheIleArgHisThr-95
133-HisAlaAlaArgThrPhe-138

160-GlnGlyPheTyrGlyVal-165
179-GlyPheLeuArgPheGlyArgPheLeuProThrLeuLeuGlnThrLeu-194

Antigenic Index - Jameson-Wolf
42-PheThrHisLysSerAsnArgAlaLeuLysPheAlaArgArgHisHis-57
77-HisThrHisArgThrAspAsnArgLysArgSerGlySerAsnPhe-91
93-ArgHisThrArgHis-97
101-AlaAlaArgArgHisLeuIleAspGlyAspGlyGlnArgAsn-114
120-ThrXxxLysLeuArgSerArgGlnThr-128
137-ThrPheGlnSerGluGlnAsnLeu-144
147-ArgLeuGlyAsnGlnLysHisArgArgAsnLeuMetThrGln-160
173-IleGlnHisLysLysAlaGly-179

Hydrophilic Regions - Hopp-Woods
45-LysSerAsnArgAlaLeuLysPheAlaArgArgHisHis-57
77-HisThrHisArgThrAspAsnArgLysArgSerGly-88
101-AlaAlaArgArgHisLeuIleAspGlyAspGlyGlnArg-113
121-XxxLysLeuArgSerArgGln-127
149-GlyAsnGlnLysHisArgArgAsnLeu-157
173-IleGlnHisLysLysAlaGly-179

013
AMPHI Regions - AMPHI
42-AspSerTyrThrPhe-46

Antigenic Index - Jameson-Wolf
17-LysSerGluArgXxxSerGlyGlyAsnMetValProArgProSerProPheLeuPro-35
39-ThrGlnLeuAspSerTyrThr-45
58-GluAlaAlaAlaGlnLysGlnProLysThrArgAlaValGly-71
91-ArgSerGlyXxxLysIle-96

Hydrophilic Regions - Hopp-Woods
17-LysSerGluArgXxxSerGly-23
58-GluAlaAlaAlaGlnLysGlnProLysThrArgAlaValGly-71

015-2
AMPHI Regions - AMPHI
33-GluLysProLeuAlaGlyPheTrpLysAlaLeuProHis-45
107-MetCysCysValAlaCysIleVal-114

Antigenic Index - Jameson-Wolf
29-TrpLysAsnProGluLysProLeu-36
90-MetArgAlaArgProArgSerThrLys-98

Hydrophilic Regions - Hopp-Woods
31-AsnProGluLysProLeu-36
90-MetArgAlaArgProArgSerThrLys-98

018-2
AMPHI Regions - AMPHI
6-IleGlnHisLeuArg-10
180-HisGlyCysGlnHisIlePhe-186

Antigenic Index - Jameson-Wolf

1-MetValGluArgHisIleGln-7
9-LeuArgAsnGlyHis-13
19-ProSerGlnGlnVal-23
25-GlnMetPheGlyGlyArgAlaTyrAspPheArgAlaAspLysAlaAlaGly-41
67-TyrPheAlaAspAspLysPhe-73
78-LeuArgGlyAsnLeuArg-83
85-PheGlnThrAspLysAlaAspLeuArgThrGlyLysHisHisAlaAspGlyAlaAlaPro-104
106-ThrAlaAlaAspIleArgValAlaAla-114
129-GlnGlnArgGlnLeuVal-134
137-IleAlaCysAspGluAspMetArgAsnThrGlyLeuHis-149
151-GlnArgValGlyAsnArgTyrAla-158

Hydrophilic Regions - Hopp-Woods
1-MetValGluArgHisIleGln-7
30-ArgAlaTyrAspPheArgAlaAspLysAlaAla-40
67-TyrPheAlaAspAspLysPhe-73
85-PheGlnThrAspLysAlaAspLeuArgThrGlyLysHisHisAlaAspGlyAlaAla-103
106-ThrAlaAlaAspIleArgValAlaAla-114
137-IleAlaCysAspGluAspMetArgAsn-145

019-2
AMPHI Regions - AMPHI
33-ProAlaAspAsnIleGlu-38
60-AspTyrGlyGlyTyrProSerAlaLeuAspAla-70
80-AlaAlaTyrLeuGluAsnAlaGlyAsp-88
90-AlaMetAlaGluAsnValArgAsnGluTrpLeuLysSer-102
142-AlaAlaGluLeuValLysAsnThrGlyLysLeuProSerGlyCysThrLysLeuLeuGluGlnAlaAlaAla
Ser-166
173-AspAlaTrpArgArgValArg-179
193-LeuAlaAlaAlaLeuGlySerProPheAspGlyGlyThrGlnGly-207
215-AsnValIleGlyLysGluAlaArgLysSer-224
229-AlaLeuLeuSerGluMet-234
259-AsnValProAlaAlaLeuAspTyrTyrGly-268
292-ArgArgTrpAspGluLeuAlaSerValIleSerHisMetProGluLysLeuGlnLys-310
329-GlnGluAlaGluLysLeuTyrLysGlnAla-338
367-AlaGlyLysAsnSerValArgArgMetAlaGlu-377
451-ArgTyrIleSerPro-455
495-GlnGlyLeuMetGlnValMet-501
582-ArgAspTyrValLysLysValMet-589

Antigenic Index - Jameson-Wolf
22-SerSerThrAsnThr-26
28-ProAlaGlyLysThrProAlaAspAsnIleGluThrAlaAspLeuSerAlaSerValProThrArgProAlaG
luProGluArgLysThrLeuAlaAspTyrGlyGlyTyrProSerAla-67
69-AspAlaValLysGlnLysAsnAspAla-77
85-AsnAlaGlyAspSerAlaMet-91
103-LeuGlyAlaArgArgGln-108
115-GluTyrAlaLysLeuGluProAlaGlyArgAlaGlnGluValGluCysTyrAlaAspSerSerArgAsnAsp
TyrThrArgAlaAlaGluLeuValLysAsnThrGlyLysLeuProSerGlyCys-156
167-GlyLeuLeuAspGlyAsnAspAlaTrpArgArgValArgGly-180
182-LeuAlaGlyArgGlnThrThrAspAlaArgAsn-192
199-SerProPheAspGlyGlyThrGlnGlySerArgGluTyr-211
217-IleGlyLysGluAlaArgLysSerProAsnAla-227
232-SerGluMetGluSerGlyLeuSerLeuGluGlnArgSer-244
254-GlnSerGlnAsnLeu-258

266-TyrTyrGlyLysValAlaAspArgArgGlnLeuThrAspAspGlnIle-281
287-AlaAlaLeuArgAlaArgArgTrpAspGlu-296
304-MetProGluLysLeuGlnLysSerProThr-313
320-ArgSerArgAlaAlaThrGlyAsnThrGlnGluAlaGluLysLeuTyrLys-336
339-AlaAlaThrGlyArgAsn-344
350-AlaGlyGluGluLeuGlyArgLysIleAspThrArgAsnAsnValProAspAlaGlyLysAsnSerValArg
ArgMetAlaGluAspGlyAlaValLysArg-383
389-GlnAsnSerGlnSerArgAlaGlyAspAlaLysMetArgArgGlnAlaGlnAla-405
409-PheAlaThrArgGlyPheAspGluAspLysLeuLeu-420
438-SerAlaGluArgThrAspArgLysLeuAsnTyr-448
454-SerProPheLysAspThrValIle-461
464-AlaGlnAsnValAsnValAspProAla-472
478-IleArgGlnGluSerArgPhe-484
488-AlaGlnSerArgValGlyAla-494
504-ThrAlaArgGluIleAlaGly-510
520-TyrThrAlaAspGlyAsnIleArgMetGly-529
535-AspThrLysArgArgLeuGlnAsnAsnGluVal-545
550-GlyTyrAsnAlaGlyProGlyArgAlaArgArgTrpGlnAlaAspThrProLeuGlu-568
579-SerGluThrArgAspTyrValLys-586
606-LeuLysGlnArgMet-610

Hydrophilic Regions - Hopp-Woods
30-GlyLysThrProAlaAspAsnIleGluThrAlaAspLeu-42
46-ValProThrArgProAlaGluProGluArgLysThrLeuAla-59
69-AspAlaValLysGlnLysAsnAspAla-77
85-AsnAlaGlyAspSerAlaMet-91
103-LeuGlyAlaArgArgGln-108
115-GluTyrAlaLysLeuGluProAlaGlyArgAlaGlnGluValGluCysTyrAlaAspSerSerArgAsrAsp
TyrThrArgAlaAlaGluLeuValLysAsnThrGlyLysLeuProSerGlyCys-156
170-AspGlyAsnAspAlaTrpArgArgValArgGly-180
185-ArgGlnThrThrAspAlaArgAsn-192
201-PheAspGlyGlyThrGlnGlySerArgGlu-210
217-IleGlyLysGluAlaArgLysSerProAsn-226
232-SerGluMetGluSer-236
238-LeuSerLeuGluGlnArgSer-244
270-ValAlaAspArgArgGlnLeuThrAspAspGlnIle-281
287-AlaAlaLeuArgAlaArgArgTrpAspGlu-296
304-MetProGluLysLeuGlnLys-310
320-ArgSerArgAlaAlaThr-325
327-AsnThrGlnGluAlaGluLysLeuTyrLys-336
350-AlaGlyGluGluLeuGlyArgLysIleAspThrArgAsnAsnValProAspAlaGlyLysAsnSerValArg
ArgMetAlaGluAspGlyAlaValLysArg-383
392-GlnSerAlaGlyAspAlaLysMetArgArgGlnAlaGlnAla-405
411-ThrArgGlyPheAspGluAspLysLeuLeu-420
438-SerAlaGluArgThrAspArgLysLeu-446
478-IleArgGlnGluSerArgPhe-484
504-ThrAlaArgGluIleAlaGly-510
535-AspThrLysArgArgLeuGlnAsn-542
554-GlyProGlyArgAlaArgArgTrpGlnAla-563
579-SerGluThrArgAspTyrValLys-586
606-LeuLysGlnArgMet-610

023
AMPHI Regions - AMPHI

42-LysGluTyrSerAlaTrpGlnAlaPhePheSerGlnThrTrpValLysValPheThrGlnValSerPheIleA
laValPheLeuHisAlaTrpValGly-74
77-AspLeuTrpMetAspTyrIleLys-84

Antigenic Index - Jameson-Wolf
1-MetValGluArgLysLeuThr-7
40-LeuProLysGluTyrSer-45

Hydrophilic Regions - Hopp-Woods
1-MetValGluArgLysLeuThr-7

025-2
AMPHI Regions - AMPHI
9-AlaAlaCysThrAlaValAlaAlaLeuLeuGlyGlyCysAla-22
36-MetGlnAspAlaProSerSerAlaValTyrAsnAsnProTyrGlyAla-51
126-AspPheArgAlaTrpAsnGlyMetThrAsp-135
140-IleGlyGlnIleValLysVal-146
206-AspPheArgAlaTrpAsnGlyMetThrAspAsnMet-217
219-SerIleGlyGlnIleValLysVal-226
248-AlaValGlnThrProValLysProAlaAla-257
261-ValGlnSerAlaProGlnPro-267
290-SerGlyThrArgSer-294
307-LysValValAlaAspPhe-312
343-GlyLeuArgGlyTyrGlyAsn-349

Antigenic Index - Jameson-Wolf
22-AlaThrGlnGlnPro-26
33-AsnSerGlyMetGlnAspAlaProSerSer-42
52-ThrProTyrSerProAlaProAlaGlyAspAlaProTyr-64
108-ValArgGlyAspThr-112
115-AsnIleSerLysArgTyrHisIleSerGlnAspAspPheArgAla-129
131-AsnGlyMetThrAspAsnThrLeu-138
144-ValLysValLysProAlaGly-150
157-AlaAlaValLysSerArgProAlaVal-165
170-GlnProProValGln-174
188-ValArgGlyAspThr-192
195-AsnIleSerLysArgTyrHisIleSerGlnAspAspPheArgAla-209
211-AsnGlyMetThrAspAsnMetLeu-218
224-ValLysValLysProAlaGly-230
232-AlaAlaProLysThrAlaAlaValGluSerArgProAlaValPro-246
252-ProValLysProAlaAlaGlnProProValGlnSerAlaProGlnPro-267
270-ProAlaAlaGluAsnLysAlaValPro-278
280-ProAlaProGlnSerProAlaAlaSerProSerGlyThrArgSerValGly-296
302-ArgProThrGlnGlyLysValValAlaAspPheGlyGlyAsnAsnLysGlyValAsp-320
333-AlaAspGlyLysVal-337
342-SerGlyLeuArgGlyTyrGly-348
363-TyrGlyHisAsnGln-367
370-LeuValGlyGluGlyGlnGlnValLysArgGlyGlnGln-382
387-GlyAsnThrAspAlaSerArgThrGlnLeu-396
398-PheGluValArgGlnAsnGlyLysProValAsnProAsnSer-411

Hydrophilic Regions - Hopp-Woods
35-GlyMetGlnAspAlaProSer-41
108-ValArgGlyAspThr-112
120-TyrHisIleSerGlnAspAspPheArg-128

144-ValLysValLysPro-148
157-AlaAlaValLysSerArgProAlaVal-165
188-ValArgGlyAspThr-192
200-TyrHisIleSerGlnAspAspPheArg-208
224-ValLysValLysPro-228
237-AlaAlaValGluSerArgProAlaVal-245
253-ValLysProAlaAla-257
270-ProAlaAlaGluAsnLysAlaValPro-278
290-SerGlyThrArgSer-294
313-GlyGlyAsnAsnLysGlyValAsp-320
333-AlaAspGlyLysVal-337
373-GluGlyGlnGlnValLysArgGlyGln-381
389-ThrAspAlaSerArgThr-394
400-ValArgGlnAsnGlyLysProValAsn-408

031
AMPHI Regions - AMPHI
11-TyrSerAlaIleArgLeuPheThrGlnAlaValIleGluPheProGlnThrAlaGluHisCysArgArgThrA
rgAsp-36
48-ArgArgProValGln-52

Antigenic Index - Jameson-Wolf
1-ArgLeuLysHisGlyVal-6
25-ProGlnThrAlaGluHisCysArgArgThrArgAspGlnHisGlnGluArgArgAsnArgGlnGlyPheArgA
rgProValGlnHisValGlyArgArgAsnGlnGlnGlnArgHisSerGlnThrCysGlyGlnSerGlyArgAsnHi
sAlaGlnLysGlnGlnCysAlaThrArgGln-84

Hydrophilic Regions - Hopp-Woods
28-AlaGluHisCysArgArgThrArgAspGlnHisGlnGluArgArgAsnArgGlnGlyPheArgArgProVal-
51
54-ValGlyArgArgAsnGlnGlnGlnArgHisSerGln-65
69-GlnSerGlyArgAsnHisAlaGlnLysGlnGlnCysAlaThrArgGln-84

032-2
AMPHI Regions - AMPHI
11-LeuArgArgProLeuArgGln-17
67-ProPheAlaAspAsnValTyrPro-74
94-ThrAlaAlaValHisGlnPheGluGln-102
114-ValHisGlyGlnIleGlnHisProValGlnProPheLeuArg-127
134-LeuGlyLeuLeuArgArgPheAspVal-142

Antigenic Index - Jameson-Wolf
1-MetArgArgAsnVal-5
10-ValLeuArgArgProLeuArg-16
28-ArgAlaValProAlaGlyLysGlnGlyPhe-37
41-CysArgLeuThrGlnArgGln-47
57-AlaAspGlnArgHis-61
107-HisArgGlnArgVal-111
138-ArgArgPheAspValGlyGlyArgVal-146
160-LeuProProArgArgLysLeuAlaSerGlnArgProPheProGln-174

Hydrophilic Regions - Hopp-Woods
1-MetArgArgAsnVal-5
10-ValLeuArgArgProLeuArg-16

28-ArgAlaValProAlaGlyLys-34
41-CysArgLeuThrGln-45
57-AlaAspGlnArgHis-61
107-HisArgGlnArgVal-111
138-ArgArgPheAspValGlyGly-144
161-ProProArgArgLysLeuAlaSer-168
033-2
AMPHI Regions - AMPHI
6-GlnTyrGlyGlyLeuAlaGlyPheProLysArgCysGluSerGlu-20
64-GlyGlnAlaPheGluAlaLeuAsnCys-72
95-ValGlyAlaLeuProLysTyrLeuAlaSerAsnValValArgAspMetHisGlyLeuLeuSerThrVal-117
120-GlnThrGlyLysValLeuAspLysIleProGlyAlaMetGlu-133
142-IleLysThrLeuAlaGlu-147
157-SerLeuPheGluAsnPhe-162
168-GlyProValAspGlyHisAsnValGluAsnLeuValAspValLeuLysAspLeuArgSerArg-188
207-AlaGluAsnAspPro-211
213-LysTyrHisAlaValAlaAsnLeuProLysGluSerAlaAla-226
242-TyrThrGlnValPheGlyLys-248
280-PheProAspArgTyrPheAspVal-287
307-LysProValValAlaIleTyrSer-314
316-PheLeuGlnArgAlaTyrAspGlnLeu-324
363-CysValProAsnMet-367
390-AlaProAlaAlaValArgTyrProArgGlyThr-400
406-ValSerAspGlyMetGluThrValGlu-414
419-IleIleArgArgGlu-423
432-PheGlySerMetValAla-437
453-MetArgPheValLysProIleAspGluGlu-462
469-ArgSerHisAspArgIle-474
489-AlaValLeuGluValLeu-494
510-AspThrValThrGlyHisGly-516
518-ProLysLysLeuLeu-522

Antigenic Index - Jameson-Wolf
11-AlaGlyPheProLysArgCysGluSerGluTyrAspAla-23
28-HisSerSerThrSerIle-33
41-AlaAlaAspLysLeuLeuGlySerAspArgArgSerVal-53
57-GlyAspGlyAlaMetThr-62
72-CysAlaGlyAspMetAspVal-78
85-AsnAspAsnGluMetSerIle-91
105-AsnValValArgAspMetHisGly-112
117-ValLysAlaGlnThrGlyLysValLeuAspLysIleProGly-130
134-PheAlaGlnLysValGluHisLysIleLysThrLeuAlaGluGluAlaGluHisAlaLysGln-154
166-TyrThrGlyProValAspGlyHisAsn-174
181-ValLeuLysAspLeuArgSerArgLysGlyProGln-192
198-ThrLysLysGlyAsnGlyTyrLysLeuAlaGluAsnAspProValLys-213
220-LeuProLysGluSerAlaAla-226
228-MetProSerGluLysGluProLysProAlaAlaLysProThrTyr-242
253-ArgAlaAlaAlaAspSerArgLeu-260
266-AlaMetArgGluGlySerGlyLeuValGluPheGluGlnArgPheProAspArgTyrPhe-285
345-ValGlyAlaAspGlyProThrHis-352
370-AlaAlaProSerAspGluAsnGluCysArg-379
395-ArgTyrProArgGlyThrGlyThrGlyAlaProValSerAspGlyMetGluThrValGluIleGlyLysGly
IleIleArgArgGluGlyGluLysThrAla-428
457-LysProIleAspGluGluLeuIle-464
467-LeuAlaArgSerHisAspArgIleValThrLeuGluGluAsnAlaGluGlnGlyGlyAlaGlyGly-488

512-ValThrGlyHisGlyAspProLysLysLeuLeuAspAspLeuGlyLeu-527
530-GluAlaValGluArgArgValArg-537
540-LeuSerAspArgAspAlaAlaAsn-547

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Hydrophilic Regions - Hopp-Woods
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13-PheProLysArgCysGluSerGluTyrAsp-22
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41-AlaAlaAspLysLeuLeuGlySerAspArgArgSerVal-53
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74-GlyAspMetAspVal-78
85-AsnAspAsnCluMetSerIle-91
106-ValValArgAspMetHis-111
123-LysValLeuAspLysIleProGly-130
134-PheAlaGlnLysValGluHisLysIleLysThrLeuAlaGluGluAlaGluHisAlaLysGln-154
181-ValLeuLysAspLeuArgSerArgLysGlyPro-191
198-ThrLysLysGlyAsnGly-203
205-LysLeuAlaGluAsnAspProValLys-213
220-LeuProLysGluSerAlaAla-226
228-MetProSerGluLysGluProLysProAlaAla-238
253-ArgAlaAlaAlaAspSerArgLeu-260
266-AlaMetArgGluGlySerGly-272
274-ValGluPheGluGlnArgPheProAspArgTyrPhe-285
372-ProSerAspGluAsnGluCys-378

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405-ProValSerAspGlyMetGluThrValGluIleGlyLysGlyIleIleArgArgGluGlyGluLysThrAla
-428
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457-LysProIleAspGluGluLeuIle-464
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467-LeuAlaArgSerHisAspArgIleValThrLeuGluGluAsnAlaGluGlnGlyGly-485
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513-ThrGlyHisGlyAspProLysLysLeuLeuAsp-523
"

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530-GluAlaValGluArgArgValArg-537
540-LeuSerAspArgAspAlaAlaAsn-547

034-2
AMPHI Regions - AMPHI

35-LeuAspHisAlaAla-39
52-AsnLeuGluGlnMetArgAlaIleMetGluAlaAlaAspGln-65
94-AlaValGluGluPheProHisIlePro-102
152-ThrValValAsnPheSer-157
168-IleGlyValLeuGlyAsnLeuGluThrGly-177
186-GlyAlaValGlyLysLeuSer-192
226-TyrLysPheThrArgProProThrGly-234
236-ValLeuArgIleAspArgIleLysGluIleHisGlnAlaLeu-249
261-SerValProGlnGluTrpLeuLysValIleAsnGluTyrGlyGlyAsnIleGlyGluThrTyrGlyValPro
ValGluGluIleValGluGlyIleLysHisGly-295
314-ArgArgTyrLeuAlaGluAsn-320
330-LeuSerLysThrIleGluAlaMetLys-338

Antigenic Index - Jameson-Wolf
20-LeuProLysGluThrGln-25
37-HisAlaAlaGluAsnSerTyrGly-44
54-GluGlnMetArgAlaIleMetGluAlaAlaAspGlnValAsp-67
75-SerAlaGlyAlaArgLysTyrAla-82
106-HisGlnAspHisGlyAlaSerProAspValCysGlnArgSerIle-120
129-MetAspGlySerLeuMetGluAspGlyLysThrProSerSerTyrGluTyr-145
164-ValGluGlyGluIle-168
173-AsnLeuGluThrGlyGluAlaGlyGluGluAspGlyVal-185
191-LeuSerHisAspGln-195
208-LysAspThrGlyVal-212
221-ThrSerHisGlyAla-225
227-LysPheThrArgProProThrGlyAspValLeuArgIleAspArgIleLysGluIleHis-246
258-GlySerSerSerValPro-263
271-AsnGluTyrGlyGlyAsnIleGlyGlu-279
287-GluIleValGluGlyIleLysHisGlyValArgLysValAsnIleAspThrAspLeuArgLeuAlaSerThr
GlyAlaVal-313
316-TyrLeuAlaGluAsnProSerAspPheAspProArgLysTyrLeuSer-331
333-ThrIleGluAlaMetLys-338
350-CysGluGlyGlnAlaGlyLysIleLysProValSerLeuGluLysMetAlaSerArgTyrAlaLysGlyGlu
Leu-374

Hydrophilic Regions - Hopp-Woods
54-GluGlnMetArgAlaIleMetGluAlaAlaAspGlnValAsp-67
76-AlaGlyAlaArgLysTyrAla-82
108-AspHisGlyAlaSerProAspValCysGln-117
132-SerLeuMetGluAspGlyLysThrProSer-141
164-ValGluGlyGluIle-168
175-GluThrGlyGluAlaGlyGluGluAspGlyVal-185
208-LysAspThrGlyVal-212
235-AspValLeuArgIleAspArgIleLysGluIleHis-246
287-GluIleValGluGlyIleLysHisGlyValArgLysValAsnIleAspThrAspLeuArgLeu-307
320-AsnProSerAspPheAspProArgLysTyrLeu-330
333-ThrIleGluAlaMetLys-338
352-GlyGlnAlaGlyLysIleLysProValSerLeuGluLysMetAlaSerArgTyrAlaLysGlyGluLeu-37
4

036-1
AMPHI Regions - AMPHI
6-AlaValTyrSerAlaCysAlaAla-13
29-GlyArgCysValAsnGlnTyr-35
59-SerSerGlyArgPheCysGlnThrIleLys-68

106-AlaAlaSerSerSerGlnSer-112
142-AlaAsnArgArgVal-146

Antigenic Index - Jameson-Wolf
16-ProAlaArgThrSerSerSerArgArgCysValSerSerGlyArgCysValAsnGlnTyrSerSerArgAlaA
spAla-41
43-ProTrpArgArgHisSerGlyAla-50
55-CysSerSerAspSerSerGlyArgPhe-63
73-ProSerPheSerAlaArgLysThrCysSerAspGlyGluThrSerAlaAspSerAsnTrpArg-93
96-HisAlaAspGlyLeuGlnThrAlaSerSerAlaAlaSerSerSerGlnSerAlaGlnThrAlaArgArgMetP
he-120
133-SerGlyArgPheCysCysGlyArgArgAlaAsnArgArgValArgHisGlyArgGlnAspAsnArgPro-15
5
158-ProMetArgGluSerArgArgGlnSerAla-167
178-LeuProAlaArgThrArgCys-184
186-CysArgLeuLysArgArgIleProProAla-195
200-ProProAlaArgProAspAsnArgSerAsnGlyGlySerSerAlaTyrArgThrMetHisLysThrLeuArg
ProTyrGluArgPro-228
Hydrophilic Regions - Hopp-Woods
18-ArgThrSerSerSerArgArgCysValSerSer-28
35-TyrSerSerArgAlaAsp-40
45-ArgArgHisSerGly-49
55-CysSerSerAspSerSerGlyArg-62
75-PheSerAlaArgLysThrCysSerAspGlyGluThrSerAla-88
107-AlaSerSerSerGlnSer-112
114-GlnThrAlaArgArgMetPhe-120
137-CysCysGlyArgArgAlaAsnArgArgValArgHisGlyArgGlnAspAsnArgPro-155
160-ArgGluSerArgArgGlnSer-166
178-LeuProAlaArgThrArgCys-184
186-CysArgLeuLysArgArgIleProPro-194
202-AlaArgProAspAsnArgSerAsnGlyGly-211
217-ThrMetHisLysThrLeuArgProTyrGluArgPro-228

038
AMPHI Regions - AMPHI
100-GluAlaLysAspHis-104
134-GluSerIleLys-137
157-GluLysGlyThrGlyGluLeuSerAlaValGlnGluValGluLys-171
178-AlaProIleAlaSerLeuAsn-184
195-GluPheGlyGlnPheLeuGluProValArgAlaTyrArgArgGlnTyrGlyVal-212

Antigenic Index - Jameson-Wolf
2-ThrAspPheArgGlnAspPhe-8
22-GluPheThrThrLysAlaGlyArgArgSerPro-32
38-GlyLeuPheAsnAspGlyLeu-44
58-IleGluSerGlyIleArg-63
85-LeuAlaGluLysGlyVal-90
96-TyrAsnArgLysGluAlaLysAspHisGlyGluGlyGly-108
125-ValIleSerAlaGlyThrSerValArgGluSerIleLysLeuIleGluAlaGluGlyAlaThrLeuAspArg
MetGluLysGlyThrGlyGlu-162
167-GlnGluValGluLysGlnTyrGlyLeu-175
191-GlnAsnAsnProGluPheGlyGln-198
203-ValArgAlaTyrArgArgGlnTyrGlyValGlu-213

Hydrophilic Regions - Hopp-Woods

2-ThrAspPheArgGlnAspPhe-8
22-GluPheThrThrLysAlaGlyArgArgSer-31
85-LeuAlaGluLysGlyVal-90
96-TyrAsnArgLysGluAlaLysAspHisGlyGlu-106
130-ThrSerValArgGluSerIleLysLeuIleGluAlaGluGlyAlaThr-145
153-LeuAspArgMetGluLysGlyThrGlyGlu-162
167-GlnGluValGluLysGlnTyr-173
204-ArgAlaTyrArgArgGlnTyrGly-211

040-2
AMPHI Regions - AMPHI
8-ValAlaHisPheArgGluAlaValProTyrIleArg-19
28-AlaGlyIleAspAsp-32
38-AspThrLeuAsnLysLeu-43
78-ProHisTyrCysArgGlyLeuArgValThrAspGlu-89
92-LeuGluGlnAlaGlnGlnPheAlaGly-100
113-SerValSerGlyPheAlaArgAlaPro-121
134-ArgProIleGlyValIleAspGly-141
146-TyrAlaGlyValIleArg-151
187-LeuGlnThrAlaAla-191
207-LeuSerAspGlyIleSerArgProAspGlyThrLeuAlaGlu-220
223-SerAlaGlnGluAlaGlnSerLeuAlaGluHisAla-234
244-SerAlaValAlaAlaLeuGluGly-251
277-IleGlyThrSerIle-281
289-IleArgGlnAlaHisSerGlyAspIleProHisIleAlaAlaLeuIleArgProLeuGlu-308
320-TyrLeuGluAsnHisIleSerGluPheSerIle-330
338-TyrGlyCysAlaAlaLeuLysThrPheAlaGluAlaAsp-350
371-ArgLeuLeuAlaHisIle-376
386-SerArgLeuPheAla-390

Antigenic Index - Jameson-Wolf
19-ArgGlnMetArgGlyLysThrLeu-26
29-GlyIleAspAspArgLeuLeuGluGlyAspThrLeuAsn-41
65-HisPheLeuAspArgHisAlaAlaAlaGlnGlyArgThrProHisTyrCysArgGlyLeuArgValThrAspG
luThrSerLeuGluGlnAlaGln-96
101-ThrValArgSerArgPheGlu-107
119-ArgAlaProSerVal-123
140-AspGlyThrAspMetGluTyr-146
150-IleArgLysThrAspThrAlaAla-157
173-LeuGlyHisSerTyrSerGlyLysThrPhe-182
208-SerAspGlyIleSerArgProAspGlyThrLeuAla-219
222-LeuSerAlaGlnGluAlaGlnSerLeuAlaGluHisAlaGlyGlyGluThrArgArgLeuIle-242
249-LeuGluGlyGlyVal-253
261-GlyAlaAlaAspGlySerLeuLeu-268
272-PheThrArgAsnGlyIleGlyThrSerIleAlaLysGluAlaPheVal-287
289-IleArgGlnAlaHisSerGlyAspIle-297
305-ArgProLeuGluGluGlnGly-311
313-LeuLeuHisArgSerArgGluTyrLeu-321
331-LeuGluHisAspGlyAsnLeuTyr-338
345-ThrPheAlaGluAlaAspCysGlyGlu-353
361-ProGlnAlaGlnAspGlyGlyTyrGlyGluArgLeu-372

377-IleAspLysAlaArgGly-382
393-ThrAsnThrGlyGlu-397
402-ArgGlyPheGlnThrAlaSerGluAspGluLeuProGluThrArgArgLysAspTyrArgSerAsnGlyArg
AsnSerHisIleLeu-430

Hydrophilic Regions - Hopp-Woods
19-ArgGlnMetArgGlyLysThr-25
29-GlyIleAspAspArgLeuGluGlyAspThrLeuAsn-41
65-HisPheLeuAspArgHisAlaAlaAlaGlnGlyArgThr-77
84-LeuArgValThrAspGluThrSerLeuGluGln-94
102-ValArgSerArgPheGlu-107
140-AspGlyThrAspMetGluTyr-146
150-IleArgLysThrAspThrAlaAla-157
210-GlyIleSerArgProAspGlyThrLeu-218
222-LeuSerAlaGlnGluAlaGlnSerLeuAlaGlu-232
234-AlaGlyGlyGluThrArgArgLeuIle-242
291-GlnAlaHisSerGlyAsp-296
305-ArgProLeuGluGluGlnGly-311
315-HisArgSerArgGluTyrLeu-321
345-ThrPheAlaGluAlaAspCysGlyGlu-353
362-GlnAlaGlnAspGlyGlyTyrGlyGlu-370
377-IleAspLysAlaArgGly-382
402-ArgGlyPheGlnThrAlaSerGluAspGluLeuProGluThrArgArgLysAspTyrArgSerAsnGlyArg
Asn-426

041-1
AMPHI Regions - AMPHI
6-AspProTyrArgHisPheGluAsnLeuAspSerAlaGluThr-19
45-AspGlyIleLeuAla-49
78-LysGlyValTyrArgValCysThrAlaAla-87
102-ValAlaAspPheAspGluLeuLeu-109
117-GlyValSerHisLeuValGluGlnProAsn-126
219-ValAsnAlaTrpArgTyrLeuAsp-226
232-IleAspLeuIleGluAlaSer-238
258-LeuAsnLeuProAsnAspCysAspValValGlyTyrLeu-270
282-TrpAsnArgAlaAsnGln-287
317-GlnAlaLeuGluSerValGluThr-324
331-AlaSerLeuLeuGluAsnValGlnGlyArg-340
382-AspPheThrThrProLeu-387
405-GlnProGlnGlnPhe-409
451-GlyPheGlyIleProGluLeuProHisTyrLeuGlySerIleGlyLys-466
493-AlaAlaGlnGlyIleSerLysHisLysSerValAspAspLeuLeuAlaValValArgAspLeuSerGluArg
-516
519-SerSerProGluHis-523
541-ValArgGluProGlnSer-546
556-LeuThrAspMetIleArgTyr-562
571-TrpThrAspGluTyrGlyAsnProGlnLysTyrGlu-582
591-LeuSerProTyrHisAsnLeuSerAspGlyIleAspTyrProPro-605
620-AlaHisAlaLeuLys-624
626-TyrAlaLysLeuArg-630
645-GlyHisThrGlyAsn-649
651-ThrGlnArgGluSer-655

Antigenic Index - Jameson-Wolf

1-MetLysSerTyrProAspProTyrArgHisPheGluAsnLeuAspSerAlaGluThrGln-20
26-AlaAsnAlaGluThrArgAlaArgPheLeuGluAsnAspLysAlaArgAlaLeuSerAspGly-46
51-LeuGlnAspThrArgGlnIleProPhe-59
61-GlnGluHisArgAlaArg-66
72-GlnAspAlaGluTyrProLysGlyVal-80
89-TyrArgSerGlyTyrProGluTrp-96
104-AspPheAspGluLeuLeuGlyAspAspValTyr-114
123-GluGlnProAsnArg-127
133-SerLysLeuGlySerAspThrAlaTyr-141
145-ValAspLeuGluAlaGlyGluLeuValGlu-154
161-AlaGlyLysAsnHisValSerTrpArgAspGluAsnSerVal-174
178-ProAlaTrpAsnGluArgGlnLeuThrGlnSerGlyTyrProArgGluValTrpLeuValGluArgGlyLys
SerPheGluGluSerLeu-207
212-IleGlyGluAspGlyMet-217
223-ArgTyrLeuAspProGlnGlySerProIleAspLeuIleGluAlaSerAspGlyPheTyr-242
249-ValSerAlaGluGlyGluAlaLysProLeuAsnLeuProAsnAspCysAspVal-266
277-ThrLeuArgLysAspTrpAsnArgAlaAsnGlnSerTyrProSer-291
298-LysLeuAsnArgGlyGluLeuGly-305
313-ProAspGluThrGlnAla-318
320-GluSerValGluThrThrLys-326
337-ValGlnGlyArgLeuLysAla-343
345-ArgPheAlaAspGlyLysTrpGlnGluValGluLeuProArgLeuProSerGly-362
365-GluMetThrAspGlnProTrpGlyGly-373
401-ValMetArgArgGlnProGlnGlnPheAspSerAspGlyIleAsn-415
422-ThrSerAlaAspGlyGluArgIle-429
435-GlyLysAsnAlaAlaProAspMet-442
479-AsnIleArgGlyGlyGlyGluPheGlyProArgTrpHis-491
496-GlyIleSerLysHisLysSerValAspAsp-505
511-ArgAspLeuSerGluArgGlyIleSerSerProGluHisIle-524
G528-lyGlySerAsnGly-532
540-PheValArgGluProGlnSerIleGlyAla-549

568-GlySerSerTrpThrAspGluTyrGlyAsnProGlnLysTyrGluValCysLysArgArgLeuGlyGluLeu
SerProTyr-594

596-AsnLeuSerAspGlyIleAspTyrPro-604

610-ThrSerLeuSerAspAspArgValHis-618
627-AlaLysLeuArgGluThrSerAla-634
639-TyrSerProAspGlyGlyGlyHisThrGlyAsnGlyThrGlnArgGluSerAlaAspGluLeu-659

Hydrophilic Regions - Hopp-Woods
3-SerTyrProAspProTyrArgHis-10
12-GluAsnLeuAspSerAlaGluThr-19
26-AlaAsnAlaGluThrArgAlaArgPheLeuGluAsnAspLysAlaArgAlaLeuSer-44
52-GlnAspThrArgGln-56
61-GlnGluHisArgAlaArg-66
72-GlnAspAlaGluTyrPro-77
104-AspPheAspGluLeuLeuGly-110
145-ValAspLeuGluAlaGlyGluLeuValGlu-154
166-ValSerTrpArgAspGluAsnSer-173
180-TrpAsnGluArgGlnLeuThr-186
198-GluArgGlyLysSerPheGluGluSerLeu-207
212-IleGlyGluAspGlyMet-217
233-AspLeuIleGluAlaSerAsp-239

249-ValSerAlaGluGlyGluAlaLysPro-257
278-LeuArgLysAspTrpAsnArg-284
298-LysLeuAsnArgGlyGluLeuGly-305
313-ProAspGluThrGlnAla-318
320-GluSerValGluThrThrLys-326
337-ValGlnGlyArgLeuLysAla-343
401-ValMetArgArgGlnProGlnGlnPheAspSerAspGlyIleAsn-415
424-AlaAspGlyGluArg-428
436-LysAsnAlaAlaProAsp-441
481-ArgGlyGlyGlyGluPheGly-487
496-GlyIleSerLysHisLysSerValAspAsp-505
511-ArgAspLeuSerGluArgGlyIleSerSer-520
540-PheValArgGluProGlnSer-546
571-TrpThrAspGluTyrGlyAsn-577
579-GlnLysTyrGluValCysLysArgArgLeuGlyGlu-590
612-LeuSerAspAspArgValHis-618
627-AlaLysLeuArgGluThrSer-633
650-GlyThrGlnArgGluSerAlaAspGluLeu-659

042-1
AMPHI Regions - AMPHI
17-AlaLeuSerAsnThrSerThr-23
33-AlaValArgSerMetMetLysIle-40
138-SerProLeuValArgIleLeuProLeuSer-147
151-SerMetValValAlaPhePheAlaAsn-159

Antigenic Index - Jameson-Wolf
14-ArgThrSerAlaLeuSerAsnThrSerThrAlaAlaGlyProSerCys-29
49-TyrSerLysGluThrGlyCysProCysProSerLeuArgLysAspSerSerThrGlyGlyArgProMetSerP
roCys-74
77-LeuAlaAsnArgAspCysValProLysAlaAspThr-88
93-ThrAspSerThrSerProArgProLeu-101
122-AlaArgAlaSerLeuProLysIleArgAlaLysVal-133
160-CysSerTyrAlaSerAlaProGlyPro-168

Hydrophilic Regions - Hopp-Woods
49-TyrSerLysGluThrGlyCys-55
59-SerLeuArgLysAspSerSerThrGlyGlyArgProMet-71
78-AlaAsnArgAspCysValProLysAlaAspThr-88
94-AspSerThrSerProArg-99
125-SerLeuProLysIleArgAlaLysVal-133

043-2
AMPHI Regions - AMPHI
24-ValGluProSerArg-28
36-HisGlyGlyLeuAspGlyAlaAlaGlyPheAspGluGlyGluArg-50
59-AlaSerGlyAspGlyPhe-64
83-AlaGlyAspPheGlyAspGlyGlnArg-91

Antigenic Index - Jameson-Wolf
1-MetProProAlaPro-5
11-IleArgArgGlnLysSerValMetProSerGluArgPheValGluProSerArg-28
35-ValHisGlyGlyLeuAspGlyAlaAlaGlyPheAspGluGlyGluArgValPhe-52
56-AlaAlaGlnAlaSerGlyAspGlyPheAla-65

79-GlnSerAspAlaAlaGlyAspPheGlyAspGlyGlnArgThrGlyGlu-94
96-ValLeuGlnAspValGlyGly-102
116-AlaGluGlyGluAlaGln-121

Hydrophilic Regions - Hopp-Woods
11-IleArgArgGlnLysSerValMetProSerGluArgPheValGluProSerArg-28
43-AlaGlyPheAspGluGlyGluArgValPhe-52
81-AspAlaAlaGlyAspPheGlyAspGlyGlnArgThrGly-93
116-AlaGluGlyGluAlaGln-121

046-2
AMPHI Regions - AMPHI
6-ArgProThrSerSerPro-11
46-ThrSerCysSerGlyLeuMetValSer-54
64-PheSerLeuPheSerSer-69
113-LysSerAlaSerSer-117
143-SerCysAsnAlaPheSerSer-149
155-ThrSerLeuLeuGlyMetAlaAlaArgPheCysAlaThrVal-168

Antigenic Index - Jameson-Wolf
6-ArgProThrSerSerProProArgArgAlaCys-16
20-IleArgThrArgSerSerAlaLysArgLysThrCysAsnAlaProGlyGlnSerIleArgProAlaSerCysS
er-44
57-ProAsnMetGluArgLeuPro-63
75-SerArgTyrSerLeuGluArgThrArgAlaMetArgProGlyMetLeuAsnArgSerAlaAla-95
105-SerLeuArgGluSerAlaSerSerLysSerAlaSerSerAlaProAlaArgSerAsnValLysGlyAspAla
ProLeuProLysThrValTrpThrSerArgArgLeuProVal-142
169-GluProThrCysProLeuProLys-176

Hydrophilic Regions - Hopp-Woods
7-ProThrSerSerProProArgArgAlaCys-16
20-IleArgThrArgSerSerAlaLysArgLysThrCysAsn-32
36-GlnSerIleArgProAlaSer-42
58-AsnMetGluArgLeuPro-63
75-SerArgTyrSerLeuGluArgThrArgAlaMetArg-86
105-SerLeuArgGluSerAlaSerSerLysSerAlaSer-116
118-AlaProAlaArgSerAsnValLysGlyAspAlaProLeu-130

047-2
AMPHI Regions - AMPHI
17-IleAlaAspIleAlaGlnAspLeuProAspGlyAla-28
62-AlaGluAsnIleGlyAlaVal-68
93-ArgLeuAlaLysGlnLeuGlu-99
141-TyrIleAspGluIleAspValPhe-148
161-SerAlaLeuLeuAla-165
185-LeuLeuGluGlyAsn-189
202-IleGlySerIleLeuAla-207
247-SerGlyIleLysTrpProGluGlyCys-255
257-IleAlaAlaValValArgAlaGlyThrGly-266
293-IleLeuAsnGluLeuGluLysLeuIle-301

Antigenic Index - Jameson-Wolf
5-GlnAlaArgArgGlyGlyLeuLeu-12
20-IleAlaGlnAspLeuProAspGlyAlaAsp-29
36-TyrArgAsnAsnArgLeu-41

51-IleGluGlyAspGlu-55
70-ProGluLeuArgProLysGluThrSerThrArgArgIleMet-83
86-GlyGlyGlyAsnIle-90
96-LysGlnLeuGluHis-100
106-IleIleGluCysArgProArgArgAlaGluTrpIle-117
119-GluAsnLeuAspAsnThrLeu-125
130-SerAlaThrAspGluThrLeuLeuAspAsnGluTyrIleAspGluIleAsp-146
152-ThrAsnAspAspGluSerAsnIle-159
168-LeuGlyAlaLysArgVal-173
178-AsnArgSerSerTyr-182
186-LeuGluGlyAsnLysIle-191
208-HisIleArgArgGlyAspIleVal-215
219-ProIleArgArgGlyThrAlaGluAlaIleGlu-229
232-AlaHisGlyAspLysLysThrSer-239
242-IleGlyArgArgIleSerGlyIleLysTrpProGluGlyCysHis-256
262-ArgAlaGlyThrGlyGluThr-268
277-ValIleGlnAspGlyAspHis-283
288-ValSerArgArgArgIleLeuAsnGluLeuGluLys-299

Hydrophilic Regions - Hopp-Woods
5-GlnAlaArgArgGlyGly-10
20-IleAlaGlnAspLeuProAspGlyAlaAsp-29
51-IleGluGlyAspGlu-55
70-ProGluLeuArgProLysGluThrSerThrArgArgIleMet-83
106-IleIleGluCysArgProArgArgAlaGluTrpIle-117
130-SerAlaThrAspGluThrLeuLeu-137
140-GluTyrIleAspGluIleAsp-146
152-ThrAsnAspAspGluSerAsnIle-159
168-LeuGlyAlaLysArgVal-173
186-LeuGluGlyAsnLysIle-191
209-IleArgArgGlyAspIle-214
219-ProIleArgArgGlyThrAlaGluAlaIleGlu-229
232-AlaHisGlyAspLysLysThrSer-239
242-IleGlyArgArgIleSer-247
277-ValIleGlnAspGlyAsp-282
289-SerArgArgArgIleLeuAsnGluLeuGluLys-299
049-2
AMPHI Regions - AMPHI
15-GlnHisLeuLeuGlu-19
34-AspAspAlaValAspGlyIleGlyGlnMet-43
50-GlnProPheGlyGln-54
61-GluHisPheAlaProValAspGlyPheArg-70
79-HisGlnArgPhePheArgIle-85
202-ArgGlyAlaGlyGlnArgArgValSerArgHisCys-213
217-AlaArgLeuThrGlnValPheGlnThrPhePhe-227

Antigenic Index - Jameson-Wolf
6-PheAspTyrArgProArgLeuLeu-13
21-IleGlyGluAsnArgHis-26
28-LeuLeuHisArgArgSerAspAspAlaValAspGlyIleGly-41
49-AspGlnProPheGly-53
64-AlaProValAspGlyPheArgValGlnAspIleAspLeuAspGlyHisGlnArgPhe-82
89-ValPheArgAsnArgArgLeuIle-96
111-LeuSerGlyPheLys-115
122-GlyIleLysProAspSerProProArgPhe-131

135-PheArgAsnArgHisLeuGlnGlySerLeuArgVal-146
150-PheLeuLysAspAspHisArgValGly-158
182-GlnHisThrGlySer-186
193-ArgHisArgArgValArgSerGlyPheArgGlyAlaGlyGlnArgArgValSerArgHisCys-213
246-LysGlnThrAsnProArgProLysArgGlyLeu-256

Hydrophilic Regions - Hopp-Woods
21-IleGlyGluAsnArgHis-26
30-HisArgArgSerAspAspAlaValAsp-38
67-AspGlyPheArgValGlnAspIleAspLeuAspGlyHisGlnArg-81
91-ArgAsnArgArgLeuIle-96
124-LysProAspSerProProArg-130
150-PheLeuLysAspAspHisArgVal-157
193-ArgHisArgArgValArgSerGlyPheArgGlyAlaGlyGlnArgArgValSerArg-211
246-LysGlnThrAsnProArgProLysArgGlyLeu-256

050-1
AMPHI Regions - AMPHI
10-IleGlnSerIleCysAspAlaPheGlnPheIleSerTyrTyr-23
25-ProLysAspTyrIleAspAlaLeuTyrLysAlaTrpGlnLys-38
94-ValAsnGluGlyVal-98
163-AsnProSerAspAsnIleValAspTrpValLeuLys-174
177-ProThrMetGlyAla-181
235-LeuGluLeuPheGluLysValAsnAla-243
250-GlyLeuGlyGlyLeuThrThr-256
275-AlaMetIleProAsn-279
302-ArgValGluAspTrpProAspLeuThr-310
315-AsnGlyLysArgValAspValAsp-322
353-LysArgLeuValAspMetLeuAsnLys-361
367-ValAspPheThrAsnArgLeu-373
379-ProValAspProValGlyAspGlu-386
396-AlaThrArgMetAspLysPheThrArgGlnMet-406
410-ThrAspLeuLeuGlyMet-415
422-GlyValAlaThrCysGluAlaIleAla-430
452-LysSerSerLysValLeuAlaPhe-459
490-AlaThrAlaProArgLysTrp-496

Antigenic Index - Jameson-Wolf
4-IleLysGlnGluAspPheIle-10
23-TyrHisProLysAspTyrIleAspAlaLeu-32
36-TrpGlnLysGluGluAsnProAlaAlaLysAspAlaMet-48
55-SerArgMetCysAlaGluAsnAsnArgProIleCysGlnAspThrGly-70
88-MetSerValGluGluMetValAsnGluGlyValArgArgAlaTyrThrTrpGluGlyAsnThrLeuArgAlaS
erVal-113
116-AspProAlaGlyLysArgGlnAsnThrLysAspAsnThr-128
138-ProGlyGlyLysValGluVal-144
148-AlaLysGlyGlyGlySerGluAsnLysSerLysLeu-159
163-AsnProSerAspAsnIle-168
192-GlyIleGlyGlyThrProGluLysAlaValLeuMetAlaLysGluSerLeu-208
213-AspIleGlnGluLeuGlnGluLysAlaAlaSerGlyAlaGluLeuSerThr-229
284-ArgHisValGluPheGluLeuAspGlySerGlyProValGluLeuThrProProArgValGluAspTrpPro
AspLeuThrTyrSerProAspAsnGlyLysArgValAspValAspLysLeuThrLysGluGluValAlaSer-331
345-LeuThrGlyArgAspAlaAlaHisLysArgLeuVal-356
359-LeuAsnLysGlyGluGluLeuPro-366

379-ProValAspProValGlyAspGluValValGlyProAlaGlyProThrThrAlaThrArgMetAspLysPhe
ThrArgGlnMetLeuGluGlnThrAsp-411
417-GlyLysSerGluArgGlyValAlaThr-425
428-AlaIleAlaAspAsnLysAla-434
450-AlaIleLysSerSerLys-455
470-PheGluValLysAspMetPro-476
481-ValAspSerLysGlyGluSerIle-488
492-AlaProArgLysTrpGlnAla-498

Hydrophilic Regions - Hopp-Woods
4-IleLysGlnGluAspPheIle-10
36-TrpGlnLysGluGluAsnProAlaAlaLysAspAlaMet-48
57-MetCysAlaGluAsnAsnArgProIleCys-66
88-MetSerValGluGluMetValAsnGluGlyValArgArg-100
117-ProAlaGlyLysArgGlnAsnThrLysAspAsnThr-128
140-GlyLysValGluVal-144
148-AlaLysGlyGlyGlySerGluAsnLysSerLysLeu-159
195-GlyThrProGluLysAlaValLeuMetAlaLysGluSerLeu-208
213-AspIleGlnGluLeuGlnGluLysAlaAlaSer-223
225-AlaGluLeuSerThr-229
284-ArgHisValGluPheGluLeuAspGly-292
299-ThrProProArgValGluAspTrpPro-307
313-ProAspAsnGlyLysArgValAspValAspLysLeuThrLysGluGluValAlaSer-331
345-LeuThrGlyArgAspAlaAlaHisLysArgLeuVal-356
359-LeuAsnLysGlyGluGluLeuPro-366
382-ProValGlyAspGluValVal-388
397-ThrArgMetAspLysPheThrArgGlnMetLeuGluGlnThrAsp-411
417-GlyLysSerGluArgGlyValAla-424
428-AlaIleAlaAspAsnLysAla-434
450-AlaIleLysSerSerLys-455
470-PheGluValLysAspMetPro-476
481-ValAspSerLysGlyGluSerIle-488
492-AlaProArgLysTrpGlnAla-498

052
AMPHI Regions - AMPHI
12-AlaProCysPheLysGlyCysGluProThrGlyAsp-23
41-AlaLysAlaSerLysSerAlaThrSerProLysGlyLeuAspGlyValSerLys-58
67-ThrAlaAlaPheHisSerPheIleSer-75
84-MetProAsnLeuValThrMetLeu-91

Antigenic Index - Jameson-Wolf
4-ValAlaGluGluThrGluIle-10
14-CysPheLysGlyCysGluProThrGlyAspSerArgLeuLeuSerThrThrLysSerAlaPro-34
37-CysAlaAsnSerAlaLysAlaSerLysSerAlaThrSerProLysGlyLeuAspGlyValSerLysAsnSerS
er-61
75-SerValGlyAspThrArgLeuThrProMet-84
97-ValValProAsnArgLeuArgLeuGluThrThrTrpSerProAlaCysArgLysValLysAsnAlaAla-119

Hydrophilic Regions - Hopp-Woods
4-ValAlaGluGluThrGluIle-10
16-LysGlyCysGluProThrGlyAspSerArgLeu-26
30-ThrLysSerAlaPro-34
39-AsnSerAlaLysAlaSerLysSerAlaThrSerProLysGlyLeuAspGlyValSerLysAsnSer-60
77-GlyAspThrArgLeu-81

100-AsnArgLeuArgLeu-104
111-AlaCysArgLysValLysAsnAlaAla-119
075
AMPHI Regions - AMPHI
15-LysSerAlaAlaLysMetProThrThrIleGlnProAlaSerIleProSer-31
65-AlaProTyrLeuArgGlnValLeu-72
80-PheLysLysCysLeuAla-85
116-AspPhePheGlnThrCysValAsnArgPhePheGluValValGluIleIleGlyIleGly-135

Antigenic Index - Jameson-Wolf
12-GluAsnThrLysSerAlaAlaLysMetPro-21
52-AlaLysAlaArgGly-56
91-PhePheArgArgProProAsnIleArgLysSerValPheGlnLysSerGluTyrAspLys-110

Hydrophilic Regions - Hopp-Woods
12-GluAsnThrLysSerAlaAlaLys-19
52-AlaLysAlaArgGly-56
91-PhePheArgArgProProAsnIleArgLysSerValPheGlnLysSerGluTyrAspLys-110
080
AMPHI Regions - AMPHI
6-GluAlaMetGluArgLeuThrArg-13
95-PheProAspThrValGlu-100
108-ProValAlaArgTrpGlyAspHis-115
144-SerAlaGluMetLeuArgArgTyrAspGluPheSerThrValLeu-158

195-LysArgLeuArgLeuPheThrGluAlaTrpGlnHis-206

Antigenic Index - Jameson-Wolf
1-MetTrpAspAsnAlaGluAlaMetGluArgLeuThr-12
33-AsnSerAsnHisLeuPro-38
42-ValSerLeuLysGly-46
48-LeuValTyrSerAspLysLysThrLeu-56
67-AsnIleLeuArgThrAspIleAsnGlyAlaGlnGluAlaTyrArg-81
90-MetValArgArgArgPheProAspThrValGlu-100
103-LeuThrGluArgLysProValAlaArgTrpGly-113
116-AlaLeuValAspGlyGluGlyAsnValPhe-125
127-AlaArgLeuAspArgProGlyMetPro-135
138-ArgGlyAlaGluGlyThrSer-144
146-GluMetLeuArgArgTyrAspGlu-153
163-LeuGlyIleLysGlu-167
187-ArgLeuGlyArgGluAsnGluMetLysArgLeuArgLeu-199
207-LeuLeuArgLysAsnLysAsnArgLeuSer-216
220-MetArgTyrLysAspGlyPheSer-227
230-TyrAlaSerAspGlyLeuProGluLysGluSerGluGlu-242

Hydrophilic Regions - Hopp-Woods

3-AspAsnAlaGluAlaMetGluArgLeuThr-12
50-TyrSerAspLysLysThrLeu-56
69-LeuArgThrAspIleAsnGlyAlaGlnGluAlaTyrArg-81
90-MetValArgArgArgPheProAspThrVal-99
103-LeuThrGluArgLysProValAlaArgTrpGly-113
116-AlaLeuValAspGlyGluGlyAsnValPhe-125
127-AlaArgLeuAspArgProGly-133

138-ArgGlyAlaGluGlyThrSer-144

146-GluMetLeuArgArgTyrAspGlu153153

163-LeuGlyIleLysGlu-167

187-ArgLeuGlyArgGluAsnGluMetLysArgLeuArgLeu-199

208-LeuArgLysAsnLysAsnArgLeuSer-216

220-MetArgTyrLysAspGlyPheSer-227
234-GlyLeuProGluLysGluSerGluGlu-242
081
AMPHI Regions - AMPHI
22-LysProValSerArgIleValThrAspSer-31
85-LeuAlaAlaLeuGlnThrLeuAlaLysAlaTrpArgGluAsn-98
116-LysGluMetLeuAlaAlaValLeuArg-124
135-ThrAlaGlyAsnPhe-139
165-MetAsnHisPheGlyGluLeuAlaValLeuThrXxxIleAlaLys-179
185-ValAsnAsnAlaMetArg-190
198-AspGlyValGlyAspIleAlaLysAla-206
303-LeuAsnAspValAlaGluGlyLeuLysGlyPheSerAsnIle-316
345-AlaAlaIleAspValLeuAlaArgMetPro-354
360-ValMetGlyAspMetGlyGluLeuGlyGluLeuGlyGlu-372
402-ValGluAlaAlaGlu-406

Antigenic Index - Jameson-Wolf
16-ProMetProSerGluSerLysProValSer-25
27-IleValThrAspSerArgAspIleArgAlaGlyAsp-38
44-AlaGlyGluArgPheAspAla-50
67-ValSerArgGluAspCysAlaAla-74
77-GlyAlaLeuLysValAspAspThrLeu-85
94-AlaTrpArgGluAsnValAsnProPhe-102
108-GlySerGlyGlyLysThrThrValLysGluMetLeu-119
123-LeuArgArgArgPheGlyAspAspAlaVal-132
138-AsnPheAsnAsnHisIle-143
151-LysLeuAsnGluLysHisArg-157
178-AlaLysProAsnAla-182
194-GlyCysGlyPheAspGlyValGlyAspIleAlaLysAlaLysSerGluIle-210
212-GlnGlyLeuCysSerAspGly-218
223-ProGlnGluAspAlaAsn-228
239-LeuAsnThrArgThrPheGlyIleAspSerGlyAspValHisAla-253
269-CysGlyAspGluArgAlaAla-275
280-ValProGlyArgHisAsnVal-286
305-AspValAlaGluGlyLeuLys-311
313-PheSerAsnIleLysGlyArgLeuAsnValLysSerGlyIleLysGly-328
330-ThrLeuIleAspAspThrTyrAsnAlaAsnProAspSerMetLysAlaAla-346
363-AspMetGlyGluLeuGlyGluLeuGlyGluAspGluAlaAla-376
384-AlaTyrAlaArgAspGlnGlyIle-391
398-GlyAspAsnSerValGluAlaAlaGluLysPheGlyAla-410
425-LeuArgHisAspLeuProGluArgAlaThrVal-435
437-ValLysGlySerArg-441
446-GluGluValValGluAlaLeuGluAspLys-455

Hydrophilic Regions - Hopp-Woods
17-MetProSerGluSerLysProValSer-25
27-IleValThrAspSerArgAspIleArgAla-36
44-AlaGlyGluArgPheAspAla-50
67-ValSerArgGluAspCysAlaAla-74
77-GlyAlaLeuLysValAspAspThrLeu-85
94-AlaTrpArgGluAsnVal-99
109-SerGlyGlyLysThrThrValLysGluMetLeu-119
123-LeuArgArgArgPheGlyAsp-129
151-LysLeuAsnGluLysHisArg-157
199-GlyValGlyAspIleAlaLysAlaLysSerGluIle-210
223-ProGlnGluAspAlaAsn-228
247-AspSerGlyAspValHisAla-253
269-CysGlyAspGluArgAlaAla-275
305-AspValAlaGluGlyLeuLys-311
316-IleLysGlyArgLeuAsnVal-322
335-ThrTyrAsnAlaAsnProAspSerMetLysAlaAla-346
363-AspMetGlyGluLeuGlyGluLeuGlyGluAspGluAlaAla-376
384-AlaTyrAlaArgAspGlnGlyIle-391
400-AsnSerValGluAlaAlaGluLysPheGlyAla-410
425-LeuArgHisAspLeuProGluArgAlaThrVal-435
446-GluGluValValGluAlaLeuGluAspLys-455

084-2
AMPHI Regions - AMPHI
6-ArgIleLysAsnMetAsnGlnThrLeuLysAsnThrLeuGly-19
21-CysAlaLeuLeuAla-25
48-AlaValGlyAlaLeuAla-53
65-PheProArgValSer-69
96-GlnIleValGlySerIleLeuGluSer-104
111-GluPheValGlyAsnLeuProGly-118

Antigenic Index - Jameson-Wolf
1-MetLysGlnSerAlaArgIleLysAsnMetAsnGlnThrLeuLysAsnThr-17
40-TyrGluTyrGlyTyrArgTyrSer-47
102-LeuGluSerAsnProAlaGluAlaArgGluPheValGly-114
139-ValSerGlyGlyGly-143

Hydrophilic Regions - Hopp-Woods
1-MetLysGlnSerAlaArgIleLysAsnMetAsnGlnThrLeu-14
105-AsnProAlaGluAlaArgGluPheVal-113
085-2
AMPHI Regions - AMPHI
41-GluArgValSerGlnIleGlyLysMetPheAspGlyLeu-53
60-LeuLysAspAlaLeuAspAsnGlyPheAsp-69
90-AsnGlyGlyArgValLeuGlyAspIleGluLeuLeuAlaAsp-103
125-ThrSerLeuValGlyTyr-130
141-IleAlaGlyAsnIleGlyThr-147
174-GluAsnThrGluSerLeu-179
193-HisLeuAspArgTyrAspAspLeuLeuAspTyr-203
212-ArgGlyAspGlyValGln-217
225-PheCysArgAlaMetLysArgAla-232
275-HisAsnAlaAlaAsnValMetAlaAlaValAlaLeuCysGluAla-289
300-HisValLysThrPheGlnGlyLeuProHisArgValGluLysIleGly-315
336-AlaAlaIleAlaGlyLeu-341

353-GlyLysGlyGlnAspPheThr-359
395-AspCysAlaThrLeuGlyGluAlaValGlnThr-405
424-SerPheAspMetPheLysGlyTyr-431

Antigenic Index - Jameson-Wolf
4-GlnAsnLysLysIleLeu-9
23-TyrLeuArgLysAsnGlyAlaGluValAlaAlaTyrAspAlaGluLeuLysProGluArgValSerGlnIleG
lyLysMetPheAsp-51
58-GlyArgLeuLysAspAlaLeuAspAsnGlyPhe-68
74-SerProGlyIleSerGluArgGlnProAspIleGluAlaPheLysGlnAsnGlyGlyArgValLeuGly-96
104-IleValAsnArgArgAspAspLysValIle-113
116-ThrGlySerAsnGlyLysThrThr-123
153-GluTrpGlnArgGluGlyLysLysAlaAsp-162
169-SerSerPheGlnLeuGluAsnThrGluSerLeuArgProThrAla-183
189-IleSerGluAspHisLeuAspArgTyrAspAspLeuLeu-201
204-AlaHisThrLysAlaLysIlePheArgGlyAspGlyVal-216
220-AsnAlaAspAspAlaPheCysArgAlaMetLysArgAlaGlyArgGluValLys-237
247-PheTrpLeuGluArgGluThrGlyArgLeuLysGlnGlyAsnGluAspLeuIleVal-265
291-GlyLeuSerArgGluAlaLeu-297
307-LeuProHisArgValGluLysIleGlyGluLysAsnGly-319
322-PheIleAspAspSerLysGlyThrAsnVal-331
351-GlyMetGlyLysGlyGlnAspPheThrProLeuArgAspAlaLeuValGlyLysAlaLys-370
378-AspAlaProGlnIleArgArgAspLeuAspGlyCysGly-390
431-TyrAlaHisArgSer-435

Hydrophilic Regions - Hopp-Woods
4-GlnAsnLysLysIleLeu-9
25-ArgLysAsnGlyAlaGlu-30
32-AlaAlaTyrAspAlaGluLeuLysProGluArgValSerGln-45
59-ArgLeuLysAspAlaLeuAspAsnGlyPhe-68
76-GlyIleSerGluArgGlnProAspIleGluAlaPheLysGlnAsnGlyGly-92
104-IleValAsnArgArgAspAspLysVal-112
118-SerAsnGlyLysThrThr-123
153-GluTrpGlnArgGluGlyLysLysAlaAsp-162
174-GluAsnThrGluSerLeuArgPro-181
189-IleSerGluAspHisLeuAspArgTyrAspAspLeuLeu-201
204-AlaHisThrLysAlaLysIlePheArgGlyAspGly-215
220-AsnAlaAspAspAlaPheCysArgAlaMetLysArgAlaGlyArgGluValLys-237
247-PheTrpLeuGluArgGluThrGlyArgLeuLysGlnGlyAsnGluAspLeuIleVal-265
291-GlyLeuSerArgGluAlaLeu-297
309-HisArgValGluLysIleGlyGluLysAsnGly-319
324-AspAspSerLysGlyThrAsn-330
353-GlyLysGlyGlnAsp-357
359-ThrProLeuArgAspAlaLeuValGlyLysAlaLys-370
380-ProGlnIleArgArgAspLeuAspGly-388
431-TyrAlaHisArgSer-435
086-2
AMPHI Regions - AMPHI
55-MetArgThrTrpArgArgLeuValPro-63
83-IleAsnGlyAlaThrArg-88
99-ProThrGluLeuPheLysLeuAlaVal-107
120-GluValLeuArgSerMetGluSerLeuGlyTrpGlnSerIleTrpArgGlyThrAlaAsn-139
155-GluMetTyrGlyArgPhe-160
185-SerPheValValIle-189
228-ArgValGlnArgValValAlaPheLeuAspProTrpLysAspProGln-243

293-GlyPhePheGlyMetCys-298
336-TrpIleGlyIleGlnSerPhe-342

Antigenic Index - Jameson-Wolf
20-LeuAlaSerLysGluGlyGlyAsp-27
55-MetArgThrTrpArgArg-60
79-AlaGlyArgGluIleAsnGlyAlaThr-87
115-PheThrArgArgGluGluValLeuArgSerMetGlu-126
134-TrpArgGlyThrAla-138
144-AlaThrAsnProGlnAlaArgArgGluThrLeuGluMet-156
225-AlaProTyrArgVal-229
236-LeuAspProTrpLysAspProGlnGlyAla-245
265-GlyLeuGlyAlaSerLeuSerLysArgGlyPheLeu-276
313-SerIleGlyLysGlnSerArgAspLeuGly-322
352-LeuProThrLysGlyLeu-357
382-IleAspTyrGluAsnArgArgLysMetArgGlyTyrArgValGlu-396

Hydrophilic Regions - Hopp-Woods
21-AlaSerLysGluGlyGlyAsp-27
79-AlaGlyArgGluIleAsnGly-85
115-PheThrArgArgGluGluValLeuArgSerMetGlu-126
147-ProGlnAlaArgArgGluThrLeuGluMet-156
238-ProTrpLysAspProGlnGly-244
270-LeuSerLysArgGlyPheLeu-276
316-LysGlnSerArgAspLeu-321
382-IleAspTyrGluAsnArgArgLysMetArgGlyTyrArgValGlu-396
087-2
AMPHI Regions - AMPHI
23-ValAlaAspSerLeuArg-28
80-GlnThrValArgGluAlaGlnArgIleIle-89
99-GlyPheGlyGlyPheValThrPheProGlyGlyLeuAlaAlaLysLeuLeu-115
129-GlyLeuSerAsnArgHisLeuSerArgTrpAlaLysArgValLeuTyrAlaPheProLys-148
157-ValGlyAsnProValArg-162
192-GlyAlaAspValLeuAsnLysThrVal-200
241-ValGluPheIleThrAspMetValSerAlaTyr-251
313-GluLysLeuAlaGluIleLeuGly-320
330-TrpAlaGluAsnAla-334

Antigenic Index - Jameson-Wolf
25-AspSerLeuArgAlaArgGly-31
37-LeuGlySerLysAspSerMetGluGluArgIleValProGlnTyrGlyIle-53
61-LysGlyValArgGlyAsnGlyIleLysArgLysLeu-72
81-ThrValArgGluAlaGlnArgIleIleArgLysHisArgVal-94
130-LeuSerAsnArgHisLeuSerArgTrpAlaLys-140
150-PheSerHisGluGlyGlyLeu-156
159-AsnProValArgAlaAspIleSer-166
171-ProAlaGluArgPheGlnGlyArgGluGlyArgLeu-182
195-ValLeuAsnLysThrVal-200
207-LeuProAspAsnAlaArgProGlnMetTyrHisGlnSerGlyArgGlyLysLeuGly-225
229-AlaAspTyrAspAla-233
235-GlyValLysAlaGluCys-240
249-SerAlaTyrArgAspAlaAsp-255
284-AlaValAspAspHisGlnThrAla-291
309-GlnLeuThrAlaGluLysLeuAlaGlu-317
321-GlyLeuAsnArgGluLysCysLeuLys-329

331-AlaGluAsnAlaArgThr-336
341-HisSerAlaAspAspValAlaGlu-348

Hydrophilic Regions - Hopp-Woods
25-AspSerLeuArgAlaArgGly-31
39-SerLysAspSerMetGluGluArgIleVal-48
66-AsnGlyIleLysArgLysLeu-72
81-ThrValArgGluAlaGlnArgIleIleArgLysHisArgVal-94
134-HisLeuSerArgTrpAlaLys-140
161-ValArgAlaAspIle-165
171-ProAlaGluArgPheGlnGlyArgGluGlyArgLeu-182
219-SerGlyArgGlyLysLeu-224
235-GlyValLysAlaGluCys-240
249-SerAlaTyrArgAspAlaAsp-255
284-AlaValAspAspHisGlnThrAla-291
310-LeuThrAlaGluLysLeuAlaGlu-317
322-LeuAsnArgGluLysCysLeuLys-329
331-AlaGluAsnAlaArg-335
341-HisSerAlaAspAspValAlaGlu-348
088-2
AMPHI Regions - AMPHI
7-HisPheSerAsnTrpLeuThrGlyLeuAsnIlePheGlnTyrThrThr-22
24-ArgAlaValMetAlaAlaLeu-30
43-ThrIleArgArgLeuThrAlaLeuLysCysGlyGln-54
88-LeuTrpGlyAsnTrpAlaAsn-94
111-GlyPheTyrAspAspTrpArgLysValValTyr-121
140-AlaIleIleAlaSerLeuAlaLeu-147
175-GlyPheLeuValLeuSerTyrLeuThrIle-184
187-ThrSerAsnAlaValAsnLeuThrAspGlyLeuAspGlyLeuAlaThr-202
221-HisSerGlnPheAlaGlnTyrLeuGlnLeuProTyr-232
245-AlaMetCysGlyAlaCysLeuGlyPhe-253

Antigenic Index - Jameson-Wolf
48-ThrAlaLeuLysCysGlyGlnAlaValArgThrAspGlyProGln-62
66-ValLysAsnGlyThrProThrMet-73
114-AspAspTrpArgLysValValTyrLysAspProAsnGlyValSerAlaLysPhe-131
193-LeuThrAspGlyLeuAsp-198
312-LysLysThrLysLysArgIle-318
328-TyrGluGlnLysGlyTrpLysGluThrGlnVal-338

Hydrophilic Regions - Hopp-Woods
56-ValArgThrAspGlyProGln-62
114-AspAspTrpArgLysValValTyrLysAspProAsnGlyVal-127
312-LysLysThrLysLysArgIle-318
331-LysGlyTrpLysGlu-335
089-2
AMPHI Regions - AMPHI
40-PheSerThrArgCysGlyArgProTrpLysValLeu-51
74-LeuAlaAlaLeuCysArgProCysAsnGlyMetSerCys-86
118-SerArgProAlaArgPhe-123

Antigenic Index - Jameson-Wolf
1-MetProProLysIleThrLysSerGlyPhe-10
40-PheSerThrArgCysGlyArgProTrpLys-49
54-SerSerAsnAlaSerArgAspLysProMetAlaSerHisLysAla-68

79-ArgProCysAsnGlyMetSerCys-86
95-CysPheArgArgProValSerArgSerAsnGlnLysSerAlaSerCysSerAsnGluAsnHisPheThrSerA
rgProAlaArgPheIleAlaArgGlnAsnAlaSerSerAlaPheLysThrCysThrProSerProArgLysIleLe
u-144

Hydrophilic Regions - Hopp-Woods
43-ArgCysGlyArgPro-47
56-AsnAlaSerArgAspLysProMetAlaSerHisLysAla-68
95-CysPheArgArgProValSerArgSerAsnGlnLysSerAlaSerCysSerAsn-112
119-ArgProAlaArgPheIleAla-125
137-ThrProSerProArgLysIle-143

090-1
AMPHI Regions - AMPHI
10-SerGlnSerLeuLysArgPheAspLysHisPheArg-21
56-SerGlnSerGlyAlaValGlyHisIle-64
141-AlaAspPhePheHisAlaValArgGlnAla-150
152-GluGlyPheAspValPheGluGlnCysPheAla-162
164-GlnThrAspGlyLeuThrGln-170
177-ValSerGlyValValGlnThrLeuGlnArg-186
226-LeuHisArgAlaAlaGluArgIleValArgIleGlnAsnLeuHisAlaVal-242
387-IleGluThrValValGlnArgIlePheGlnThrAla-398
404-ProValLysHisLeuThrAspLeuArg-412
425-AsnLeuArgAlaValPheAlaGlnValGlyAsnHisGlyAsnThrArgThrAlaGluSer-444

Antigenic Index - Jameson-Wolf
9-AlaSerGlnSerLeuLysArgPheAspLysHisPheArg-21
29-HisIleLysAlaArgAlaGlyGlyAlaGluGlnHis-40
53-AsnGlyPheSerGlnSerGly-59
73-AlaAspLeuArgArgIleAspThrAsnGlnGlu-83
94-AlaGlnGlyArgGluVal-99
107-GlnAsnHisGluGluArgIleLeuGlnThrGlyAsnArgGlyGlySerArgAlaAspIleArg-127
149-GlnAlaLeuGluGly-153
161-PheAlaArgGlnThrAspGlyLeuThrGlnSerHisGlySerHisAspValSerGly-179
187-AsnValLeuArgAspAsnGln-193
214-PheGlnArgLysProPheTyr-220
228-ArgAlaAlaGluArgIleValArg-235
269-GlnHisArgArgArgSerArgThrGlnAla-278
285-GluAlaGlyLysLeuGln-290
304-ArgLeuGlnAsnArgArgAlaAspIleAlaArgAspAsnGlyIle-318
320-ProAlaLeuAspThrGluIleAlaAspGlnAlaArgTyrArgGly-334
339-AlaGlyAsnArgAsnTyr-344
353-ValArgGlnGlnPhe-357
379-AspAlaGlyThrGluSerGlnAsnIle-387
398-AlaArgValLysHisGlnProValLysHisLeuThrAspLeuArgHis-413
421-IleIleArgSerAsnLeuArg-427
434-GlyAsnHisGlyAsnThrArgThrAlaGluSerGlyAspGluAspPhePhe-450

Hydrophilic Regions - Hopp-Woods

11-GlnSerLeuLysArgPheAspLysHisPheArg-21
29-HisIleLysAlaArgAlaGlyGlyAlaGluGlnHis-40
73-AlaAspLeuArgArgIleAspThrAsnGln-82
94-AlaGlnGlyArgGluVal-99

107-GlnAsnHisGluGluArgIleLeu-114
117-GlyAsnArgGlyGlySerArgAlaAspIleArg-127
163-ArgGlnThrAspGlyLeuThr-169
173-GlySerHisAspVal-177
187-AsnValLeuArgAspAsnGln-193
228-ArgAlaAlaGluArgIleValArg-235
269-GlnHisArgArgArgSerArgThrGln-277
285-GluAlaGlyLysLeuGln-290
305-LeuGlnAsnArgArgAlaAspIleAlaArgAspAsnGlyIle-318
322-LeuAspThrGluIleAlaAspGlnAlaArgTyrArg-333
380-AlaGlyThrGluSerGlnAsnIle-387
398-AlaArgValLysHisGlnPro-404
407-HisLeuThrAspLeuArgHis-413
421-IleIleArgSerAsnLeu-426
437-GlyAsnThrArgThrAlaGluSerGlyAspGluAspPhePhe-450

091-2

AMPHI Regions - AMPHI
11-ProLeuSerAspGlyIleAlaSerCys-19
21-IleThrArgLeuGlnAlaLeuVal-28
33-ValLeuValSerValLeuThrSerLeuAlaLys-43

Antigenic Index - Jameson-Wolf
1-LeuSerArgArgCysProProLeuProLysProLeuSerAspGlyIleAla-17
73-LeuArgCysArgLeuProLysProSerAspArgPheAsp-85
105-LeuAspAsnProLeuArgCysArgLeuProIleProSerAspArgPheGly-121

Hydrophilic Regions - Hopp-Woods
1-LeuSerArgArgCysProProLeu-8
75-CysArgLeuProLysProSerAspArgPheAsp-85
107-AsnProLeuArgCys-111
115-IleProSerAspArgPhe-120

092

AMPHI Regions - AMPHI
55-GlyMetSerGlyIleAlaGluValLeuHis-64
76-AlaArgAsnAlaAlaThrGluHisLeu-84
95-HisThrAlaGluHisValAsnGly-102
120-ValAlaAlaLeuGlu-124
137-AlaGluLeuMetArgPheArgAsp-144
209-LeuThrProIleMetSerValValThrAsnIleAsp-220
226-ThrTyrGlyHisSerValGluLysLeuHisGlnAlaPheIleAspPheIleHisArg-244
259-HisValArgAlaIleLeuProLysValSerLysProTyr-271
273-ThrTyrGlyLeuAspAspThrAla-280
321-AsnValLeuAsnAlaLeuAlaAlaIle-329
339-ValGluAlaIleGlnLysGly-345
353-GlyArgArgPheGlnLysTyrGlyAspIleLys-363
407-ArgTyrThrArgThrArgAspLeuPheGluAspPheThrLysValLeuAsnThrValAspAlaLeu-428
449-LeuAlaArgAlaIleArgValLeuGlyLysLeu-459
464-CysGluAsnValAlaAspLeuProGluMetLeuLeuAsn-476

Antigenic Index - Jameson-Wolf
14-LeuTrpArgAlaAsnGlyGlnProPheLys-23
25-ThrProLeuArgIleGluAsnProProGluArgAsnIleMetMetLysAsnArgVal-43
70-ValSerGlySerAspGlnAlaArgAsnAlaAla-80
111-AlaValLysLysGluAsnProGluVal-119
140-MetArgPheArgAspGlyIle-146

150-GlyThrHisGlyLysThrThrThr-157
184-GlyThrAsnAlaArgLeuGlyLysGlyGluTyr-194
198-GluAlaAspGluSerAspAla-204
218-AsnIleAspGluAspHisMetAspThrTyrGly-228
230-SerValGluLysLeuHis-235
255-IleAspSerGluHisVal-260
263-IleLeuProLysValSerLysProTyrAla-272
275-GlyLeuAspAspThrAlaAsp-281
286-AspIleGluAsnValGlyAla-292
302-MetLysGlyHisGluGlnGlySerPhe-310
351-GlyValGlyArgArgPheGlnLysTyrGlyAspIleLysLeuProAsnGlyGly-368
374-AspAspTyrGlyHisHisPro-380
393-AlaTyrLeuGluLysArgLeu-399
404-GlnProHisArgTyrThrArgThrArgAspLeuPheGluAspPheThrLys-420
435-AlaAlaGlyGluGluProIleAlaAlaAlaAspSerArgAlaLeuAlaArg-451
466-AsnValAlaAspLeuPro-471
478-LeuGlnAspGlyAspIle-483
488-GlyAlaGlySerIleAsn-493

Hydrophilic Regions - Hopp-Woods
26-ProLeuArgIleGluAsnProProGluArgAsnIleMetMetLysAsnArgVal-43
71-SerGlySerAspGlnAlaArgAsnAlaAla-80
111-AlaValLysLysGluAsnProGlu-118
140-MetArgPheArgAsp-144
152-HisGlyLysThrThr-156
187-AlaArgLeuGlyLysGlyGlu-193
198-GluAlaAspGluSerAspAla-204
218-AsnIleAspGluAspHisMetAsp-225
230-SerValGluLysLeuHis-235
256-AspSerGluHisVal-260
275-GlyLeuAspAspThrAlaAsp-281
303-LysGlyHisGluGlnGlySer-309
351-GlyValGlyArgArgPheGlnLys-358
360-GlyAspIleLysLeu-364
393-AlaTyrLeuGluLysArgLeu-399
407-ArgTyrThrArgThrArgAspLeuPheGluAspPheThrLys-420
435-AlaAlaGlyGluGluProIleAlaAlaAlaAspSerArgAlaLeuAlaArg-451
466-AsnValAlaAspLeuPro-471
479-GlnAspGlyAspIle-483
093-2
AMPHI Regions - AMPHI
26-ThrAlaIleLeuAsn-30
59-ThrAlaPheAsnIleLeuHisGly-66
159-LysSerValTyrGluGluLeuLysHisLeu-168
196-IleHisIleIleProAlaThrGluPhe-204
254-PheLeuLysAspThr-258
267-IleAsnThrLeuProGlyMetThrSer-275

Antigenic Index - Jameson-Wolf
12-GlyGlyPheSerSerGluArgGluIleSerLeuAspSerGlyThr-26
32-LeuLysSerLysGlyIleAsp-38
41-AlaPheAspProLysGluThrProLeuSerGluLeuLysAlaGlnGly-56
66-GlyThrTyrGlyGluAspGlyAlaVal-74
96-GlyMetAspLysTyrArgCys-102
120-HisAspAspThrAspPheAspAlaValGluGluLysLeuGly-133

140-ProAlaAlaGluGlySerSer-146
151-LysValLysGlyLysGlyArgLeuLysSerValTyrGluGluLeuLysHisLeuGln-169
176-ArgPheIleGlyGlyGlyGluTyrSer-184
189-AsnGlyLysGlyLeuPro-194
203-GluPheTyrAspTyrGluAlaLysTyrAsnArgAspAspThrIleTyrGlnCysProSerGluAspLeuThr
GluAlaGluGluSerLeuMetArg-234
245-GlyAlaGluGlyCysVal-250
253-AspPheLeuLysAspThrAspGly-260
270-LeuProGlyMetThr-274
279-ValProLysSerAlaAla-284

Hydrophilic Regions - Hopp-Woods
15-SerSerGluArgGluIleSerLeu-22
32-LeuLysSerLysGlyIleAsp-38
41-AlaPheAspProLysGluThrProLeuSerGluLeuLysAla-54
68-TyrGlyGluAspGlyAlaVal-74
96-GlyMetAspLysTyrArgCys-102
120-HisAspAspThrAspPheAspAlaValGluGluLysLeuGly-133
140-ProAlaAlaGluGlySerSer-146
151-LysValLysGlyLysGlyArgLeuLysSerValTyrGluGluLeuLysHisLeuGln-169
205-TyrAspTyrGluAlaLysTyrAsnArgAspAspThrIle-217
221-ProSerGluAspLeuThrGluAlaGluGluSerLeuMetArg-234
253-AspPheLeuLysAspThrAspGly-260
094
AMPHI Regions - AMPHI
17-LeuProProIleThrLysValGlySer-25
80-PheSerPheLeuThrAlaVal-86

Antigenic Index - Jameson-Wolf
3-SerProLeuProLysArgAlaLeu-10
24-GlySerSerProAlaAlaProArgMetGluAla-34
50-MetProSerArgLysArgIleAsnSerAlaAsnIleArgAlaArgGlyIleThr-67

Hydrophilic Regions - Hopp-Woods
5-LeuProLysArgAlaLeu-10
28-AlaAlaProArgMetGluAla-34
51-ProSerArgLysArgIleAsn-57
60-AsnIleArgAlaArgGly-65
095-2
AMPHI Regions - AMPHI
9-CysAlaSerAsnLeuPheArgGlnCysGlnGlnArgGlyGlyAspAlaValAsp-26
38-ValLeuGlnAsnValGlnGlnHisPheGlyGlnIleGlyAsnValPheAlaVal-55
86-PheGlyGlnHisGlnArgValAsnGlyIleGluAspPheGlyLysValPheLysGlnIleAlaArg-107
132-GlyArgArgHisPheAspGlyValValSer-141
174-PheLeuAspArgPheAsnArgCysAlaAspPheGlnArgHisAlaAspGlyCysGlnCysValGlnHisVal
-197
204-GlnHisAspPheLys-208
236-AspValGlyGlyIleValGlnThrValSerSerIle-247
274-ThrValAspGluIleAspLysArgLeuMetGlnPhePheAspAlaVal-289
313-GlyCysIleArgLeuValGly-319
370-AsnGlyAspAlaValThrGluAlaHisGlnLeuArgGlnHisGlnGlyAla-386
412-AspAspIleArgThrValAsnValPheGlyGlyMet-423
435-MetLeuGlySerGlyIleSerArgLeuIleArgThrGly-447
451-AlaGlnIleValGlnAspPheGlyAspAlaAlaHisAla-463

Antigenic Index - Jameson-Wolf
6-SerGlyGlyCysAlaSerAsnLeu-13
16-GlnCysGlnGlnArgGlyGlyAspAlaValAspAlaSerArgAlaHisIle-32
62-GlnHisAlaAspGlyAlaGlyLysSerAlaGlyIleGlyGlyGlyAsnArgLeuPhe-80
88-GlnHisGlnArgValAsnGlyIleGluAspPheGlyLys-100
112-ValArgLeuGluGlyGluTyr-118
127-AlaCysGlyGlyLysGlyArgArgHisPheAspGly-138
144-ValHisGlnGluArgGlyProAla-151
163-AlaAlaAlaAspAlaPheLysAlaGluGlnAlaPhe-174
176-AspArgPheAsnArgCysAlaAspPheGlnArgHisAlaAspGlyCysGln-192
205-HisAspPheLysArg-209
253-GlyGlnAsnArgAlaAspVal-259
263-AsnThrGlnLysGlyPheAlaVal-270
273-HisThrValAspGluIleAspLysArgLeu-282
300-IleGlyAsnAspGlyHisAsnArgCysGlnValGlnLysGlyCys-314
339-PheAlaAlaAspAsnGluSerArgValLysSerCysArgAlaGluAspGlyGlyGlyGlnAlaGlyGlyArg
GlyPheAlaValArgAlaGlyAsnGlyAspAlaValThr-375
378-HisGlnLeuArgGlnHisGlnGlyAlaArgAsnAsnGlyAsn-391
394-LeuGlnArgSerAspAsnPheGly-401
405-PheAspGlyGlyArgGlyAsnAspAspIleArgThr-416
442-ArgLeuIleArgThrGlyAsnPheLys-450
461-AlaHisAlaAspAlaAlaAspThrAspLysMetAspValGlyAsn-475

Hydrophilic Regions - Hopp-Woods
17-CysGlnGlnArgGlyGlyAspAlaValAspAlaSerArgAlaHisIle-32
64-AlaAspGlyAlaGlyLysSerAlaGly-72
93-AsnGlyIleGluAspPheGlyLys-100
112-ValArgLeuGluGlyGluTyr-118
128-CysGlyGlyLysGlyArgArgHisPhe-136
145-HisGlnGluArgGlyPro-150
163-AlaAlaAlaAspAlaPheLysAlaGluGlnAlaPhe-174
182-AlaAspPheGlnArgHisAlaAspGly-190
205-HisAspPheLysArg-209
273-HisThrValAspGluIleAspLysArgLeu-282
300-IleGlyAsnAspGlyHisAsnArgCysGlnVal-310
339-PheAlaAlaAspAsnGluSerArgValLysSerCysArgAlaGluAspGlyGlyGly-357
368-AlaGlyAsnGlyAspAlaValThr-375
378-HisGlnLeuArgGlnHisGlnGlyAlaArgAsnAsnGly-390
395-GlnArgSerAspAsn-399
407-GlyGlyArgGlyAsnAspAspIleArgThr-416
461-AlaHisAlaAspAlaAlaAspThrAspLysMetAspVal-473
096-2
AMPHI Regions - AMPHI
19-GlyIlePheGluGluIleAspAlaHis-27
37-AlaAlaAsnArgGln-41
61-GlyValValAlaVal-65
112-GlnPhePheValAsnAlaPheGln-119
129-AlaTyrAlaAlaAlaPheGlyArg-136
172-AsnGlnPheAlaAla-176
187-AspThrAlaAlaGlyIleGlyAsnAlaGln-196
228-GlnTrpGlyPhePhe-232

Antigenic Index - Jameson-Wolf
1-MetAlaArgHisThrGlyGlnGlyVal-9
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22-GluGluIleAspAla-26
"

"

30-PheArgThrAspCysLeuArgAlaAlaAsn-39
"

"

75-GlyCysGlyAsnAspValTyrAla-82
"

"

88-ValGlnAspGlyAla-92
"

"

97-AlaAlaAspLysThrPheGlyAsn-104
137-ArgPheHisLysHisArgGln-143
157-ValGlnAspGlyGluLeuGlyAsnGlyGlnSerGlnCysLeu-170
181-AlaAspGlyGlyCysGlyAspThr-188
211-ThrValLysAspValGluCysArgLeu-219

Hydrophilic Regions - Hopp-Woods
1-MetAlaArgHisThrGlyGln-7
"

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22-GluGluIleAspAla-26
33-AspCysLeuArgAlaAlaAsn-39
97-AlaAlaAspLysThrPheGly-103
137-ArgPheHisLysHisArgGln-143
158-GlnAspGlyGluLeuGlyAsn-164
183-GlyGlyCysGlyAspThr-188
211-ThrValLysAspValGluCysArgLeu-219
097-2
AMPHI Regions - AMPHI
28-AlaGlyLeuThrThrPheLeuThrMetCysTyrIleVal-40
72-MetGlyPheValGly-76
166-AlaThrLeuValGlyLeuGlyAspIleHisGlnProSerAlaLeuLeuAlaLeuPheGly-185
207-ThrIleThrValIleAlaSerLeuMetGlyLeuAsnGluPheHisGlyIleIleGlyGluValProSerIle
-230
242-LeuPheThrValSer-246
260-PheAspSerThrGlyThrLeu-266
342-LeuAlaLysSerValProAlaPheAlaThr-351
362-MetLeuArgSerAlaArgAspIle-369

Antigenic Index - Jameson-Wolf
1-MetAspThrSerLysGlnThrLeu-8
13-PheLysLeuLysAlaAsnGlyThrThrValArgThrGluLeu-26
125-LysValArgGluMetLeu-130
260-PheAspSerThrGly-264
277-ValAspGlyLysLeuProArgLeuLysArg-286
317-SerAlaGlyGlyArgThrGly-323

364-ArgSerAlaArgAspIleAspTrpAspAspMetThrGlu-376
410-LeuCysArgArgThrLysAspValProPro-419

Hydrophilic Regions - Hopp-Woods
1-MetAspThrSerLys-5
16-LysAlaAsnGlyThrThrValArgThrGluLeu-26
125-LysValArgGluMetLeu-130
279-GlyLysLeuProArgLeuLysArg-286
318-AlaGlyGlyArgThr-322
364-ArgSerAlaArgAspIleAspTrpAspAspMetThrGlu-376
410-LeuCysArgArgThrLysAspValPro-418
098-2
AMPHI Regions - AMPHI
29-AlaGluAlaGlyAspGlnPheValGlyAsp-38
110-ValGlyAspPhePheLysLeuAlaPhe-118
120-CysGlnIleGlnAsnValValThrAlaIleAlaGlnIleValAla-134
163-LeuSerSerPheSerHisGly-169

Antigenic Index - Jameson-Wolf
24-ValGlnGluAspAlaAlaGluAlaGlyAspGlnPheVal-36
68-MetGlyMetCysArg-72
78-PheAsnHisThrAspArgGlnAlaAla-86
136-ThrAlaAsnGlyThrGlnSerGlyIleThrGlyArgAsnAlaArgLysArgAsnGlyPhe-155
158-PheGluGlyArgGlyLeuSerSerPheSerHisGlyIle-170
180-ValPheArgArgProMetArgIleCys-188

Hydrophilic Regions - Hopp-Woods
24-ValGlnGluAspAlaAlaGluAlaGlyAsp-33
79-AsnHisThrAspArgGlnAla-85
144-IleThrGlyArgAsnAlaArgLysArgAsnGly-154
158-PheGluGlyArgGly-162
180-ValPheArgArgProMetArg-186
099 (delete this one--mistaken sequence)
AMPHI Regions - AMPHI
6-SerMetMetArgLeuProAspIle-13
47-AlaPheValGluPhePheGlyGluGly-55
102-LysLeuValGluThrTyrAlaLysThr-110
114-TrpAlaAspAlaLeuLysThrAla-121
135-ThrArgAsnMetAlaGlyProSerAsn-143
154-AlaAlaLysGlyLeuAlaLysProTyrGluGluProSerAspGly-168
178-AlaAlaIleThrSerCysThrAsnThrSerAsnProArgAsnVal-192
251-ThrCysAsnGlyMetSer-256
341-IleAspAlaValValAlaGluTyrValLysProGlnGlnPheArgAspValTyrVal-359
371-ProSerProLeuTyrAspTrpArg-378
381-SerThrTyrIleArg-385
398-ArgThrLeuArgGlyMetArgProLeu-406
443-AspPheAsnSerTyrAlaThr-449
468-PheAsnGluMetValLys-473
494-MetArgMetTrpGluAlaIleGluThrTyrMet-504
532-ArgLeuAlaGlyVal-536
539-IleValAlaGluGlyPheGluArgIleHisArgThrAsn-551
575-GlyThrGluThrTyr-579

Antigenic Index - Jameson-Wolf
17-GluLeuAsnGlyLysArgGlnAlaGly-25

38-PheLeuArgLysGluArgValVal-45
53-GlyGluGlyAlaArgSer-58
60-SerIleGlyAspArgAlaThr-66
70-MetThrProGluPhe-74
83-IleAspGluGlnThr-87
94-ThrGlyArgAspAspAlaGlnValLysLeu-103
133-SerValThrArgAsnMetAlaGlyProSerAsnProHis-145
157-GlyLeuAlaLysProTyrGluGluProSerAspGlyGlnMetProAspGly-173
183-CysThrAsnThrSerAsnProArgAsnVal-192
201-AsnAlaAsnArgLeuGlyLeuLysArgLysProTrpVal-213
216-SerPheAlaProGlySerLysValAla-224
235-ProGluMetGluLysLeu-240
251-ThrCysAsnGlyMetSerGlyAlaLeuAspProLysIleGlnLysGluIleIleAspArgAspLeuTyr-27
3
279-SerGlyAsnArgAsnPheAspGlyArgIleHisProTyrAlaLys-293
312-IleArgPheAspIleGluAsnAspVal-320
322-GlyValAlaAspGlyLysGluIleArgLeuLysAsp-333
335-TrpProAlaAspGluGluIleAspAlaVal-344
348-TyrValLysProGlnGlnPheArgAspVal-357
363-AspThrGlyThrAlaGlnLysAlaProSerProLeuTyrAspTrpArgProMetSerThrTyrIleArgArg
ProProTyrTrp-390
394-LeuAlaGlyGluArgThrLeuArgGlyMetArg-404
409-LeuProAspAsnIleThrThrAspHisLeuSerProSerAsn-422
438-GlyLeuProGluGluAspPheAsnSerTyrAlaThrHisArgGlyAspHisLeuThr-456
463-AlaAsnProLysLeuPhe-468
471-MetValLysAsnGluAspGlySerValArgGlnGlySerPheAlaArgValGluProGluGlyGluThr-49
3
503-TyrMetAsnArgLysGlnPro-509
516-AlaAspTyrGlyGlnGlySerSerArgAspTrpAlaAlaLysGlyValArg-532
543-GlyPheGluArgIleHisArgThrAsnLeu-552
562-PheLysProAspThrAsnArgHis-569
571-LeuGlnLeuAspGlyThrGluThrTyrAspValValGlyGluArgThrProArgCysAspLeu-591
595-IleHisArgLysAsnGlyGluThrValGlu-604
612-AspThrAlaGluGlu-616

Hydrophilic Regions - Hopp-Woods
18-LeuAsnGlyLysArgGlnAlaGly-25
38-PheLeuArgLysGluArgValVal-45
53-GlyGluGlyAlaArg-57
60-SerIleGlyAspArgAlaThr-66
83-IleAspGluGlnThr-87
94-ThrGlyArgAspAspAlaGlnValLysLeu-103
157-GlyLeuAlaLysProTyrGluGluProSerAspGlyGlnMetProAsp-172
205-LeuGlyLeuLysArgLysProTrpVal-213
235-ProGluMetGluLysLeu-240
259-LeuAspProLysIleGlnLysGluIleIleAspArgAspLeuTyr-273
282-ArgAsnPheAspGlyArgIle-288
312-IleArgPheAspIleGluAsnAspVal-320
324-AlaAspGlyLysGluIleArgLeuLysAsp-333
335-TrpProAlaAspGluGluIleAspAlaVal-344
366-ThrAlaGlnLysAlaPro-371
394-LeuAlaGlyGluArgThrLeuArgGlyMetArg-404
438-GlyLeuProGluGluAspPheAsn-445
450-HisArgGlyAspHis-454
471-MetValLysAsnGluAspGlySerValArg-480

485-AlaArgValGluProGluGlyGluThr-493
503-TyrMetAsnArgLysGlnPro-509
518-TyrGlyGlnGlySerSerArgAspTrpAlaAlaLysGlyValArg-532
543-GlyPheGluArgIleHisArg-549
562-PheLysProAspThrAsnArgHis-569
574-AspGlyThrGluThr-578
580-AspValValGlyGluArgThrProArgCysAsp-590
596-HisArgLysAsnGlyGluThrValGlu-604
612-AspThrAlaGluGlu-616
099-2
AMPHI Regions - AMPHI
30-ProGlySerTyrAspLysLeuPro-37
57-ProThrLeuGlnSerTrpLeuGlyGln-65
91-ThrAlaLeuValAspLeuAlaGlyLeuArgAsp-101
106-LysGlyGlyAspProAlaLysValAsn-114
138-AlaPheArgLysAsn-142
212-AspSerLeuGlyVal-216
234-AlaSerMetMetArgLeuProAspIle-242
276-AlaPheValGluPhePheGlyGluGly-284
331-LysLeuValGluThrTyrAlaLysThr-339
343-TrpAlaAspAlaLeuLysThrAla-350
364-ThrArgAsnMetAlaGlyProSerAsn-372
383-AlaAlaLysGlyLeuAlaLysProTyrGluGluProSerAspGly-397
407-AlaAlaIleThrSerCysThrAsnThrSerAsnProArgAsnVal-421
480-ThrCysAsnGlyMetSer-485
570-IleAspAlaValValAlaGluTyrValLysProGlnGlnPheArgAspValTyrVal-588
600-ProSerProLeuTyrAspTrpArg-607
610-SerThrTyrIleArg-614
627-ArgThrLeuArgGlyMetArgProLeu-635
672-AspPheAsnSerTyrAlaThr-678
697-PheAsnGluMetValLys-702
723-MetArgMetTrpGluAlaIleGluThrTyrMet-733
761-ArgLeuAlaGlyVal-765
768-IleValAlaGluGlyPheGluArgIleHisArgThrAsn-780
804-GlyThrGluThrTyr-808

Antigenic Index - Jameson-Wolf
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3-AlaAsnGlnArgTyrArgLysProLeuProGlyThrAspLeuGluTyrTyrAsp-20
22-ArgAlaAlaCysGluAspIleLysProGlySerTyrAspLysLeuProTyr-38
47-LeuValAsnArgAlaAspLysValAspLeuPro-57
67-IleGluGlyLysGlnGluIle-73
97-AlaGlyLeuArgAspAlaIleAlaGluLysGlyGlyAspProAlaLys-112
131-CysGlyGlyTyrAspProAspAlaPheArgLysAsnArgGluIleGluAspArgArgAsnGluAspArgPhe
-154
162-ThrAlaPheGluAsn-166
181-AsnLeuGluLysMetSer-186
200-ThrCysValGlyThrAspSerHisThrProHisValAspSer-213
222-GlyGlyLeuGluAlaGluThr-228
246-GluLeuAsnGlyLysArgGlnAlaGly-254
267-PheLeuArgLysGluArgValVal-274
282-GlyGluGlyAlaArgSer-287
289-SerIleGlyAspArgAlaThr-295

299-MetThrProGluPhe-303
312-IleAspGluGlnThr-316
323-ThrGlyArgAspAspAlaGlnValLysLeu-332
362-SerValThrArgAsnMetAlaGlyProSerAsnProHis-374
386-GlyLeuAlaLysProTyrGluGluProSerAspGlyGlnMetProAspGly-402
412-CysThrAsnThrSerAsnProArgAsnVal-421
430-AsnAlaAsnArgLeuGlyLeuLysArgLysProTrpVal-442
445-SerPheAlaProGlySerLysValAla-453
464-ProGluMetGluLysLeu-469
480-ThrCysAsnGlyMetSerGlyAlaLeuAspProLysIleGlnLysGluIleIleAspArgAspLeuTyr-50
2
508-SerGlyAsnArgAsnPheAspGlyArgIleHisProTyrAlaLys-522
541-IleArgPheAspIleGluAsnAspVal-549
551-GlyValAlaAspGlyLysGluIleArgLeuLysAsp-562
564-TrpProAlaAspGluGluIleAspAlaVal-573
577-TyrValLysProGlnGlnPheArgAspVal-586
592-AspThrGlyThrAlaGlnLysAlaProSerProLeuTyrAspTrpArgProMetSerThrTyrIleArgArg
ProProTyrTrp-619
623-LeuAlaGlyGluArgThrLeuArgGlyMetArg-633
638-LeuProAspAsnIleThrThrAspHisLeuSerProSerAsn-651
667-GlyLeuProGluGluAspPheAsnSerTyrAlaThrHisArgGlyAspHisLeuThr-685
692-AlaAsnProLysLeuPhe-697
700-MetValLysAsnGluAspGlySerValArgGlnGlySerPheAlaArgValGluProGluGlyGluThr-72
2
732-TyrMetAsnArgLysGlnPro-738
745-AlaAspTyrGlyGlnGlySerSerArgAspTrpAlaAlaLysGlyValArg-761
772-GlyPheGluArgIleHisArgThrAsnLeu-781
791-PheLysProAspThrAsnArgHis-798
800-LeuGlnLeuAspGlyThrGluThrTyrAspValValGlyGluArgThrProArgCysAspLeu-820
824-IleHisArgLysAsnGlyGluThrValGlu-833
841-AspThrAlaGluGlu-845

Hydrophilic Regions - Hopp-Woods
5-GlnArgTyrArgLysProLeuPro-12
22-ArgAlaAlaCysGluAspIleLysProGlySerTyrAsp-34
47-LeuValAsnArgAlaAspLysValAspLeu-56
67-IleGluGlyLysGlnGluIle-73
97-AlaGlyLeuArgAspAlaIleAlaGluLysGlyGlyAspProAlaLys-112
132-GlyGlyTyrAspProAspAlaPheArgLysAsnArgGluIleGluAspArgArgAsnGluAspArgPhe-15
4
181-AsnLeuGluLysMetSer-186
205-AspSerHisThrProHis-210
224-LeuGluAlaGluThr-228
247-LeuAsnGlyLysArgGlnAlaGly-254
267-PheLeuArgLysGluArgValVal-274
282-GlyGluGlyAlaArg-286
289-SerIleGlyAspArgAlaThr-295
312-IleAspGluGlnThr-316
323-ThrGlyArgAspAspAlaGlnValLysLeu-332
386-GlyLeuAlaLysProTyrGluGluProSerAspGlyGlnMetProAsp-401
434-LeuGlyLeuLysArgLysProTrpVal-442
464-ProGluMetGluLysLeu-469
488-LeuAspProLysIleGlnLysGluIleIleAspArgAspLeuTyr-502
511-ArgAsnPheAspGlyArgIle-517
541-IleArgPheAspIleGluAsnAspVal-549

553-AlaAspGlyLysGluIleArgLeuLysAsp-562
564-TrpProAlaAspGluGluIleAspAlaVal-573
595-ThrAlaGlnLysAlaPro-600
623-LeuAlaGlyGluArgThrLeuArgGlyMetArg-633
667-GlyLeuProGluGluAspPheAsn-674
679-HisArgGlyAspHisLeuThr-685
700-MetValLysAsnGluAspGlySerValArg-709
714-AlaArgValGluProGluGlyGluThr-722
732-TyrMetAsnArgLysGlnPro-738
747-TyrGlyGlnGlySerSerArgAspTrpAlaAlaLysGlyValArg-761
772-GlyPheGluArgIleHisArg-778
791-PheLysProAspThrAsnArgHis-798
803-AspGlyThrGluThr-807
809-AspValValGlyGluArgThrProArgCysAsp-819
824-IleHisArgLysAsnGlyGluThrValGlu-833
841-AspThrAlaGluGlu-845

102
AMPHI Regions - AMPHI
42-ValLeuLeuTyrThrTrpPheSerMetLeu-51
67-GlyAlaSerPheAspThrMetValLysAspLeuLeuGlyArgGlyTrpAsnIleIleAsnGlyIleAla-89
109-ThrAlaLysGlyLeuGlySerAlaAla-117
128-LeuValPhePheGlyIleLeuAlaPheCys-137
144-LeuValAspArgPheThrGlyValLeu-152
155-GlyMetValLeuThr-159
207-AsnValSerSerLeuLeuLysTyrPheLys-216
221-LysValAlaLysSerIle-226
265-ValLeuIleGluThrLeuSerLysPheAlaGlnThrGlyAsnMetAspLysIleLeuSerLeuPheSerTyr
MetAla-290
303-PheAspTyrIleAlaAspIlePheLysTrpAsnAsp-314
341-PheValThrAlaIleGlyTyr-347
352-AlaThrValTrpThrGlyIleIlePro-360
374-GlyLysThrTyrLysVal-379

Antigenic Index - Jameson-Wolf
1-MetProAsnLysThrProSer-7
64-TyrProHisGlyAla-68
77-LeuLeuGlyArgGly-81
107-AspLeuThrAlaLysGlyLeuGlySerAlaAlaGlyGly-119
169-AlaAspAlaLysProSerVal-175
179-ThrGlnAlaProAlaGlyThr-185
214-TyrPheLysGlyAspAlaProLysValAla-223
246-GlyAsnLeuProArgAsnGluPhe-253
274-AlaGlnThrGlyAsnMetAspLysIle-282
311-LysTrpAsnAspSerIleSerGlyArgThrLysThr-322
364-LeuTyrArgSerArgLysLysPheGlyAlaGlyLysThrTyrLysVal-379

Hydrophilic Regions - Hopp-Woods
1-MetProAsnLysThr-5
169-AlaAspAlaLysPro-173
215-PheLysGlyAspAlaProLysValAla-223
248-LeuProArgAsnGluPhe-253
277-GlyAsnMetAspLys-281
316-IleSerGlyArgThrLysThr-322
366-ArgSerArgLysLysPheGlyAla-373

105-2
AMPHI Regions - AMPHI
11-TrpIleGlyLeuGly-15
22-ValThrArgLeuLeuAsp-27
51-LysValTyrGlyAsnThrAlaGluLeu-59
74-AlaAlaValCysAspIleLeuAsnGlyValArgAspGlyLeu-87
97-ThrIleSerProThr-101
110-ValGluAlaAlaGlyGlyGlnPheAlaGluAlaProVal-122
143-AlaValLeuAsnProLeuGlnLysIlePheSer-153
162-PheGlyAspValGlyLysGlySer-169
176-AsnSerLeuLeuGlyIlePheGlyGluAlaTyr-186
203-IleValGluAlaIleGlyXxxSerAla-211
249-LeuGluGlnAlaGlyAsnThrLeuProAlaValGlu-260
263-AlaAlaSerTyrArgLysAlaValGluAla-272

Antigenic Index - Jameson-Wolf
25-LeuLeuAspGlyGlyIleGlu-31
34-ValTyrAsnArgSerProAspLysThrAlaProIleSerAlaLysGlyAlaLysValTyrGlyAsnThr-56
81-AsnGlyValArgAspGlyLeuAla-88
96-SerThrIleSerProThrGluAsnLeuAla-105
121-ProValSerGlySerValGlyProAlaThr-130
139-GlyGlySerGluAla-143
155-ValGlyLysLysThrPheHisPheGlyAspValGlyLysGlySerGly-170
196-PheGlyIleAspThrAspThrIleVal-204
211-AlaMetAspSerProMetPheGlnThrLysLysSerLeuTrpAlaAsnArgGluPheProPro-231
237-HisAlaSerLysAspLeuAsnLeuAlaValLysGluLeuGluGlnAlaGlyAsnThrLeuPro-257
264-AlaSerTyrArgLysAlaValGluAlaGlyTyrGlyGluGlnAspValSerGly-281

Hydrophilic Regions - Hopp-Woods
25-LeuLeuAspGlyGlyIle-30
37-ArgSerProAspLysThrAlaProIleSerAlaLysGlyAlaLys-51
81-AsnGlyValArgAspGlyLeuAla-88
164-AspValGlyLysGlySerGly-170
196-PheGlyIleAspThrAspThrIle-203
218-GlnThrLysLysSerLeuTrpAla-225
237-HisAlaSerLysAspLeuAsnLeuAlaValLysGluLeuGluGlnAlaGly-253
265-SerTyrArgLysAlaValGlu-271
273-GlyTyrGlyGluGlnAspVal-279
109-2
AMPHI Regions - AMPHI
6-GlyThrTyrArgAspLeuHisArgProAlaSerGlu-17
53-LeuIleProAlaMetAlaGlyThrIleGly-62
69-AlaValAlaAlaAlaPhe-74
145-GlyLeuLeuMetAla-149
156-IleMetAlaLysLeuThrSer-162
177-GlyThrThrGlyGlnValLysLysLeuPheSerTrpAlaGly-190
207-ValMetTyrAlaLeuLeuGluHisTrpLysLysArgTrpLeu-220
222-ValProLeuGlyCysLeuIleAla-229
294-HisGlnValPheGlnLysIle-300
326-ValGlySerIleLeuGly-331
336-ThrSerSerTrpGlyThr-341
471-AlaValGlyMetLeuProGlyIleProProPheLeuGluHisPheLysSerLeu-488

Antigenic Index - Jameson-Wolf

1-MetGluLysHisAsnGlyThrTyrArgAspLeuHisArgProAlaSer-16
18-PheAlaThrArgAspGluTyrLeuGlu-26
32-MetGlnProLysArgTrpArgProAsnLeuProPheArgAspTyrArgPheGluTrp-50
78-LeuGlyLeuProAsp-82
109-ProGlyAlaAsnLeuProGlyThrHis-117
160-LeuThrSerAsnGlyVal-165
179-ThrGlyGlnValLysLys-184
259-GluAsnSerGlyTrp-263
301-SerTyrProGluLysThrAspLysVal-309
312-AsnIleAspAspThrMetThr-318
348-IleAlaLysArgProIleProGlyGly-356
398-AlaGlyMetGluMetThrArgLysGlyLysThrThrGln-410
441-GlyCysLysGluArgSerAla-447

Hydrophilic Regions - Hopp-Woods
1-MetGluLysHisAsnGlyThrTyrArgAspLeuHisArgProAlaSer-16
18-PheAlaThrArgAspGluTyrLeuGlu-26
35-LysArgTrpArgPro-39
44-ArgAspTyrArgPheGluTrp-50
180-GlyGlnValLysLys-184
301-SerTyrProGluLysThrAspLysVal-309
313-IleAspAspThrMetThr-318
348-IleAlaLysArgProIlePro-354
398-AlaGlyMetGluMetThrArgLysGlyLysThrThrGln-410
441-GlyCysLysGluArgSerAla-447
111-2
AMPHI Regions - AMPHI
6-ArgLeuProAsnPheIleArgVal-13
27-SerGluGlnThrTyrThrValLys-48
58-ProSerProAlaGluIleGlnLysArgIleAspAspAlaLeuLysGluValAsnArgGlnMetSerPheAsnG
lnHisThrAlaGlyLeuArgIleSer-102
128-GlyProLeuValAsnLeuTrp-134
151-IleLysGlnAlaAlaSerTyrThrGlyAspTyrAlaSerLeu-174
183-LeuAspLeuSerSerIleAlaLys-190
198-AlaGlyGluTyrLeuValGluIleGlyGly-215
237-AsnIleValGlnLeuSerHisIle-276
314-GluThrGluAlaLeu-318

Antigenic Index - Jameson-Wolf
1-MetProSerGluThrArgLeuProAsnPhe-10
CysSerGluGlnThrAla-31
37-GlnGlyGluThrMetGlyTyr-45
49-TyrLeuSerAsnAsnArgAspLysLeuProSerProAlaGluIleGlnLysArgIleAspAspAlaLeuLysG
luValAsnArgGlnMetSerThrTyrGlnProAspSerGluIleSerArgPheAsnGlnHisThrAlaGlyLysPr
oLeuArgIleSerSerAspPhe-105
111-GluAlaValArgLeuAsnArg-117
GlyPheGlyProAspLysSerValThrArgGluProSerProGluGlnIleLysGlnThrGly-159
163-IleIleLeuLysGlnGlyLysAspTyrAlaSerLeuSerLysThrHisProLysAla-181
187-SerPheGlyValAspLysValAlaGlyGluLeuGluLysTyrGly-205
213-IleGlyGlyGluLeuHisGlyLysGlyLysAsnAlaArgGlyGluProTrpArgIleGlyIleGluGlnPro
AsnIle-238
240-GlnGlyGlyAsnLeuAsnAsnArgSerLeuAlaThrSerGlyAspTyrArg-262
264-PheHisValAspLysAsnGlyLysArgLeuSerIleAsnProAsnAsnLysArgProIleSerAlaMetThr
AlaAspGlyLeuSer-306
314-GluThrGluAlaLeuLysLeuAlaGluArgGluLysLeu-326

332-ValArgAspLysGlyGlyTyrArgMetSerSerGluPheGluLysLeuLeuArg-351

Hydrophilic Regions - Hopp-Woods
1-MetProSerGluThrArgLeu-7
26-CysSerGluGlnThrAlaThrMet-41
51-SerAsnAsnArgAspLysLeuProSer-59
61-AlaGluIleGlnLysArgIleAspAspAlaLeuLysGluValAsnArgGlnGlnProAspSerGluIleSerA
rg-89
97-LysProLeuArgIleSerSer-103
111-GluAlaValArgLeuAsnArg-117
137-GlyProAspLysSerValThrArgGluProSerProGluGlnIleLysGln-153
163-IleIleLeuLysGlnGlyLysAspTyrAlaSer-173
175-SerLysThrHisPro-179
196-LysValAlaGlyGluLeuGluLysTyrGly-205
217-LeuHisGlyLysGlyLysAsnAlaArgGlyGluProTrp-229
267-AspLysAsnGlyLysArgLeuSerProAsnAsnLysArgProIle-285
299-AlaMetThrGlyLeuGluThrGluAlaLeuLysLeuAlaGluArgGluLysLeu-326
332-ValArgAspLysGlyGlyTyr-338
344-SerGluPheGluLysLeuLeuArg-351
117-1
AMPHI Regions - AMPHI
6-ProIleGlnAspThrGlnSerAla-13
15-LeuGlnGluLeuArgGluTrpPheAspSerTyrCysAlaThrPro-55
57-GlyGluProLeuProAspHisHisGluLeuAspLeuLeu-77
79-AspAlaValAlaAlaThrLeuLeuAlaAspIleGlyArgTyr-92
94-ProAspTrpLeuValSerCysAsnSerThrValAlaGluLeuValLysGlyValAspGluValGlnLysLeuT
hrHisPheAlaArgValAlaSerLeuGlnAlaGluThrLysMetLeuLeuAlaMet-150

170-PheLeuSerAsnAlaProAspSerProGluLysAspIlePhe-191
216-LysProGluLysTyrArgArgLeuGluTyrIleGluAsnPheLeuAsnIleLeuArg-246
260-GlyArgProLysHisIleTyrSerIleTyrLys-270
282-LeuPheAspIleArg-286

290-IleLeuValAspThrValProGluCysTyrThrThrLeuGlyIleValHisSerLeuTrpGlnProIlePro
GlyGluPheAspAspTyrIleAla-321
327-GlyTyrLysSerLeuHisThr-333
351-AspMetHisGlnPheAsnGluPheGlyValAla-361
385-GlnLeuLeuAspTrp-389

412-AspThrHisGlyLysValHisSerSerIleGlyAspArgLeuGluAsn-465

485-TyrGluLysAlaIleGlyLysIleArgAlaTyrGlnGlnAsnAlaAsp-508
510-ValArgGluGlnLeuAlaLysLeuGlnGluLeuAlaGluGlyTyrLysLysProGluAspLeuTyrThrAsn
ArgAlaIleGlnLysAlaCysGlyThrLeuAsnGluProPro-571
585-LysIleLysLysGlyGlyMetThrThrLeuAlaLysCysCysLysProAlaAspAspIleIleGly-620
636-ProSerPheGlnHisLeuAlaGluHisAlaProGluLysValLeuAspAlaLeuGlnGlu-659

679-ArgAspValSerAspAla-684
714-GlnValAsnAspLeuProArgValLeuAlaSerLeuGlyAspValLysGlyValLeuSerValThrArg-73
6

Antigenic Index - Jameson-Wolf
5-SerProIleGlnAspThrGlnSerAlaThr-14
16-GlnGluLeuArgGluTrpPheAspSerTyrCysAlaAlaLeuProAspAsnAspLysAsnLeuHisTyrProA
la-50

52-AlaAlaThrProTyrGlyGluProLeuProAspHisPhe-64

72-HisAspLeuLeuPro-78

88-AspIleGlyArgTyrValProAspTrp-96

100-ValSerGluArgCysAsnSerThrVal-108
110-GluLeuValLysGlyValAspGluValGlnLysHis-123
125-AlaArgValAspSerLeuAlaThrProGluGluArgAlaGlnGlnAlaGluThrMetArg-144

162-AlaMetArgThrArgThr-167
173-AsnAlaProAspSerProGluLysArgAlaValAlaLysGluThrLeu-188

209-AspLeuGlyPheArgHisGlnLysProGluLysTyrArgGluLeuAspGluLysArgThrGluArgLeuGlu
Tyr-237

245-LeuArgGlyGluLeuLysLysTyrAsnValAlaGlyArgProLysHisLysMetValLysLysLysLeuSer
Phe-279
283-PheArgAlaThrValProGluCysTyr-299
311-ProIleProGlyGluPheAspAspTyrIleAlaAsnProLysGlyAsnGlyTyrLysSerIleValGlyPro
GluAspLysGlyValGluValGlnIleArgThr-349
356-AsnGlyTrpArgTyrLysGluGlyGlyLysGlyAspSerAlaTyrGluGlnLys-379

387-LeuAspTrpArgGluAsnMetAlaGluSerGlyLysGluAspLeuAlaAla-403
418-ThrProHisGlyLysProThrGly-429
440-HisSerSerIleGlyAspArgCysArgGlyAlaLysValGluGlyThrProLeuGluAsnGlyGlnArgVal
GluIleIleThrAlaLysGluGlyHisProSerValAsnGlyTrpValLysSerAsnLysAlaIleGlyLysAla-
500
502-IleArgGlnGlnAsnAlaAspThrValArgGluGluGlyArgValGlnLeuAspLysGlnLeuAla-523
525-LeuThrProLysProAsnLeuGlnGluLeuAlaGlu-536
538-LeuGlyTyrLysLysProGluAspLeuGlyGlnGlyGluIleSerAsnArgAlaIleGlnLysAlaCysGly
ThrLeuAsnGluProProProValPro-574
582-LysGlnSerLysIleLysLysGlyGlyLysAsnGlyVal-594
596-IleAspGlyGluAspGlyLeu-602
608-LysCysCysLysProAlaProProAspAspIleIleValThrArgGluArgGlyIleSerValHisArgLys
ThrCysProSerPhe-638
644-HisAlaProGluLysValLeuAspGlnIleGluIleArgAlaGlnAspArgSerGlyLeuLeuArgAspVal
SerAspAlaLeuAlaArgHisLysLeu-690
696-GlnThrGlnSerArgAspLeuGluAlaSerMet-706
710-LeuGluValLysGlnValAsnAspLeuProArg-720
726-GlyAspValLysGly-730

Hydrophilic Regions - Hopp-Woods

8-GlnAspThrGlnSer-12
16-GlnGluLeuArgGluTrpPhe-22

30-ProAspAsnAspLysAsnLeu-36
48-TyrProAlaProLeuProHisAspLeuLeuPro-78

100-ValSerGluArgCysAsnSerThrGluLeuValLysGlyValAspGluValGlnLysHis-123
125-AlaArgValAspSer-129
131-AlaThrProGluGluArgAlaGlnGlnAlaGluThrMetArg-144
162-AlaMetArgThrArgThrAlaProAspSerProGluLysArgAlaValAlaLysGluThrLeu-188

209-AspLeuGlyPheArgHisGlnLysProGluLysTyrArgGluLeuAspGluLysArgThrGluArgLeuGlu
Tyr-237

245-LeuArgGlyGluLeuLysLysTyr-252
258-ValAlaGlyArgLysHisLysMetValLysLysLysLeuSerPhe-279

283-PheArgAlaThrValPro-296
314-GlyGluPheAspAsp-318
323-ProLysGlyAsnGly-327

337-GlyProGluAspLysGlyValGluValGlnIleArgThr-349
351-AspGlnArgTyrLysGluGlyGlyLysGlyAspSerAlaTyrGluGlnLeuAspTrpArgGluAsnMetAla
GluSerGlyLysGluAspLeuAlaAla-403
405-PheLysLeuPheIleGlyAspArgCysArgGlyAlaLysValGluGlyLeuGluAsnGlyGlnArgValGlu
IleIleThrAlaLysGluGlyHisPro-479

489-ValLysSerAsnLysAlaIleGlyLysAla-500
502-IleGlnAsnAlaAspThrValArgGluGluGlyArgValGlnLeuAspLysGlnLeuAla-523
538-LeuGlyTyrLysProGluAspLeuGly-551
553-GlyGluIleSerAsn-557
582-LysGlnSerLysIleLysLysGlyGlyLysVal-594
596-IleAspGlyGluAspGlyLeu-602
608-LysCysCysLysProAlaProProAspAsp-617

623-ThrArgGluArgGlyIleSerValHisArgLysThrCysHisAlaProGluLysValLeu-650

658-GlnIleGluIleArgAlaGlnAspArgSerGlyLeuLeuArgAspValSerAspAlaLeuAlaArgHisLys
LeuThrGlnSerArgAspLeuGluAlaSerMet-706
710-LeuGluValLysGlnValAsnAspLeuProArg-720
726-GlyAspValLysGly-730

118-2

AMPHI Regions - AMPHI
11-ArgArgAsnIleGlyLysTrpTyrAsp-31
61-ProArgTyrIleGlyThrIleIleAspPheLeuMetValProAsn-79
102-GluArgLeuLysThrMetLeuArg-109

Antigenic Index - Jameson-Wolf
8-LysAsnPheArgArgAsnIleThrCysPheGluGlyTyrAspGluAsnSerPhe-25
27-GlyLysTrpTyrAspAspGlyValTrpAspAspGluGluTyrTrpLysLeuGluAsnAspLeuIleGluValA
rgLysLysTyrProTyrProMetAspIle-60
93-AspSerValGlyIleAsnGluArgTyrGluArgLeuLysThr-106
112-PheThrGluLysAspIleValAspTyrTyrAsnLysLys-128

Hydrophilic Regions - Hopp-Woods
8-LysAsnPheArgArgAsnIleThr-15
33-GlyValTrpAspAspGluGluTyrTrpLysLeuGluAsnAspLeuIleGluValArgLysLysTyrProTyrA
spIle-60
95-ValGlyIleAsnGluArgTyrGluArgLeuLysThr-106
112-PheThrGluLysAspIleVal-118

120-2

AMPHI Regions - AMPHI
6-LysAsnIlePheSerAla-11
49-SerGlyAsnAlaTyrLysIleValSerThrIleLys-60
77-AsnThrLeuHisProThrTyrTyrArgAspIleArgArg-89
142-IleThrAsnGlyLysLysLeuTyrSerValGlyGlyLeuAsnLysAlaGly-158

189-ProSerLeuAsnAsnIleProAla-196

Antigenic Index - Jameson-Wolf
3-LysThrPheLys-6
35-SerGlySerTyrGly-39
45-ThrPheGluArgSerGlyAsnAlaTyrLys-54
68-PheGluSerGlyGlyThrValVal-75
85-ArgAspIleArgArgGlyLysLeuTyrAlaGlu-95
97-LysPheAlaAspGlySerValThrTyrGlyLysAlaGlyGluSerLysThrGluGlnSerProLysAla-119
131-AlaAsnAspAlaLysLeuProProGlyLeuLysIleThrAsnGlyLysLysLeuTyrSer-150
153-GlyLeuAsnLysAlaGlyThrGlyLysTyrSerIleGlyGlyValGluThrGluValValLysTyrArgVal
ArgArgGlyAspAspAlaVal-183
199-GlyTyrThrAspAspGlyLysThrTyr-207
218-GlyGlnAlaAlaLysPro-223

Hydrophilic Regions - Hopp-Woods
45-ThrPheGluArgSerGlyAsn-51
85-ArgAspIleArgArgGlyLysLeuTyrAla-94
107-LysAlaGlyGluSerLysThrGluGlnSerProLysAla-119
131-AlaAsnAspAlaLysLeu-136
143-ThrAsnGlyLysLysLeuTyr-149
155-AsnLysAlaGlyThrGly-160
167-ValGluThrGluValValLysTyrArgValArgArgGlyAspAspAla-182
200-TyrThrAspAspGlyLysThrTyr-207
219-GlnAlaAlaLysPro-223
121-1
AMPHI Regions - AMPHI
42-ProGlyArgLeuArgArg-47
68-GlnGluLeuSerArgLeuTyrAlaGlnThr-77
101-ThrValArgHisAlaPro-106
148-ProAlaPheHisGlu-152
165-LeuAsnIleGlyGlyIleAlaAsnIle-173
189-ProGlyAsnMetLeuMetAspAlaTrpThr-198
216-GlyAsnIleLeuProGlnLeuLeuAspArgLeuLeu-227
237-ProLysSerThrGly-241
251-GluThrTyrLeuAsp-255
262-AspValLeuArgThrLeuSerArgPheThrAlaGlnThrValCysAspAlaValSerHis-281
303-AlaAspLeuAlaGluCysPhe-309
341-IleAsnArgIleProGlySerPro-348

Antigenic Index - Jameson-Wolf
13-ThrSerMetAspGlyAlaAsp-19
23-IleArgMetAspGlyGlyLysTrpLeuGly-32
40-ProTyrProGlyArgLeuArgArgGlnLeuLeuAspLeuGlnAspThrGlyAlaAspGluLeuHisArgSerA
rgIleLeuSer-67
86-AsnLeuAlaProSerAspIleThrAla-94
97-CysHisGlyGlnThrValArgHisAlaProGluHisGlyTyrSer-111
119-LeuLeuAlaGluArgThrArg-125
128-ThrValGlyAspPheArgSerArgAspLeuAlaAlaGlyGlyGlnGly-143
154-LeuPheArgAspAsnArgGluThrArgAla-163
177-ProProAspAlaPro-181
184-GlyPheAspThrGlyProGlyAsn-191
205-ProTyrAspLysAsnGlyAlaLysAlaAlaGlnGlyAsn-217
235-ProHisProLysSerThrGlyArgGlu-243
253-TyrLeuAspGlyGlyGluAsnArgTyrAspValLeuArgThrLeuSerArg-269

283-AlaAlaAspAlaArgGln-288
293-GlyGlyGlyIleArgAsnProValLeu-301
321-LeuAsnLeuAspProGlnTrp-327
344-IleProGlySerProHisLysAlaThrGlyAlaSerLysProCysIle-359

Hydrophilic Regions - Hopp-Woods
13-ThrSerMetAspGlyAlaAsp-19
43-GlyArgLeuArgArgGlnLeuLeuAspLeuGlnAspThrGlyAlaAspGluLeuHisArgSerArgIleLeuS
er-67
101-ThrValArgHisAlaPro-106
119-LeuLeuAlaGluArgThrArg-125
131-AspPheArgSerArgAspLeuAlaAla-139
154-LeuPheArgAspAsnArgGluThrArgAla-163
206-TyrAspLysAsnGlyAlaLysAlaAlaGln-215
236-HisProLysSerThrGlyArgGlu-243
254-LeuAspGlyGlyGluAsnArgTyrAspVal-263
283-AlaAlaAspAlaArgGln-288
345-ProGlySerProHisLysAlaThrGlyAlaSer-355
122-1
AMPHI Regions - AMPHI
6-AsnIleHisLysThrPhe-11
42-ThrPheLeuArgCysLeuAsnAlaLeuGluMetProGlu-54
102-LeuGluAsnValMetGlu-107
126-LysLeuLeuGluLys-130
176-ProGluLeuValGlnAspValLeuAspThrMetLysGluLeuAla-190
227-ProGlnAspLeuPheAspHisPro-234

Antigenic Index - Jameson-Wolf
5-ArgAsnIleHisLysThrPheGlyGluAsnThrIle-16
23-AspValCysLysGlyGln-28
34-GlyProSerGlySerGlyLysThrThr-42
51-GluMetProGluAspGlyGlnIleGluPheAspAsnGluArgProLeuLysIleAspPheSerLysLysProS
erLysHisAspIle-79
81-AlaLeuArgArgLysSerGlyMet-88
96-PheProHisLysThrAlaLeu-102
114-GlyLysProAlaAlaGlnAlaArgGluGluAlaLeuLysLeuLeuGlu-129
131-ValGlyLeuGlyAspLysValAspLeuTyr-140
142-TyrGlnLeuSerGlyGlyGlnGlnArgValGlyIle-154
168-AspGluProThrSerAlaLeuAspProGluLeuVal-179
182-ValLeuAspThrMetLysGluLeuAlaGlnGluGly-193
216-MetAspGlyGlyVal-220
222-ValGluGlnGlySerProGlnAspLeuPheAspHisProLysHisGluArgThrArgArgPheLeuSer-24
4
246-IleGlnSerThrLysIle-251
Hydrophilic Regions - Hopp-Woods
51-GluMetProGluAspGlyGlnIleGluPheAspAsnGluArgProLeuLysIleAspPheSerLysLysProS
erLysHisAsp-78
81-AlaLeuArgArgLysSerGly-87
114-GlyLysProAlaAlaGlnAlaArgGluGluAlaLeuLysLeuLeuGlu-129
131-ValGlyLeuGlyAspLysValAsp-138
168-AspGluProThrSerAlaLeuAspProGluLeuVal-179
182-ValLeuAspThrMetLysGluLeuAlaGln-191
229-AspLeuPheAspHisProLysHisGluArgThrArgArgPheLeu-243
126-1
AMPHI Regions - AMPHI

73-GlyCysGlnSerValGlnGluAla-80
112-PheGlnLeuValGluAla-117
143-LeuAspAlaGlyCysGln-148
150-LeuMetProTrpAlaAlaProIleGlyThrGlyLeuGlyAlaVal-164
213-SerGlyAspProValAsnMetAlaArgAlaPhe-223

Antigenic Index - Jameson-Wolf
7-GluThrPheProSerArgLeu-13
24-GluIleLeuLysGlnSerIle-30
41-SerLeuArgArgAlaGlySerGlyGlyGluAlaHisGlyGlnGlyPhe-56
85-GlnMetAlaArgGluValPheGlu-92
99-GluLeuIleGlyAspAspAspThrLeuGln-108
121-LeuIleLysAspGlyPheLysValLeu-129
141-ArgLeuLeuAspAlaGlyCys-147
171-ValLeuArgGluArgLeuProAspThrProLeu-181
209-AlaValSerArgSerGlyAspProValAsn-218
228-GluSerGlyArgLeuAlaPhe-234
237-GlyProValGluAlaArgAspLysAlaGlnAlaSerThrProThrVal-252

Hydrophilic Regions - Hopp-Woods
41-SerLeuArgArgAlaGlySerGlyGlyGluAlaHis-52
85-GlnMetAlaArgGluValPheGlu-92
100-LeuIleGlyAspAspAspThrLeuGln-108
171-ValLeuArgGluArgLeuProAsp-178
210-ValSerArgSerGlyAspPro-216
228-GluSerGlyArgLeuAlaPhe-234
237-GlyProValGluAlaArgAspLysAlaGlnAla-247
127
AMPHI Regions - AMPHI
6-MetLeuAspThrTrpLeuGlyAla-13
20-AlaValGluSerValAlaAla-26
119-ValGlyAspTyrIleGluIle-125
135-IleAsnLeuLeuAsnThrLeuMet-142
147-ProAsnProLeuValGlyGlnLeuAla-155
206-LeuGluProLeuCysAlaPro-212
214-IleProAlaIleGlnArgXxxLeuGluAsnValGln-225
250-ArgIleIleValArgPheAlaSerProVal-259
268-AlaValMetAspGluPheLeuArgVal-276

Antigenic Index - Jameson-Wolf
16-IleArgAlaGluAlaValGlu-22
41-HisPheLysArgHisProAspPheGlyIleGluSerLysArgArgPheLeuVal-58
112-SerAlaThrGlnGlnTyrSerVal-119
126-AsnGlyLeuArgGlyArgValValAsp-134
169-HisProValArgArgAspAsnIleLeu-177
193-LeuAspSerAspGluAlaValCysArg-201
234-AlaAlaArgProArgValThrArgValProTyrAspAspLysAlaTyr-249
257-SerProValSerLysArgLeuGluIle-265
282-AsnHisProAlaGlySerGluThrLeu-290

Hydrophilic Regions - Hopp-Woods
16-IleArgAlaGluAlaValGlu-22
42-PheLysArgHisProAspPheGlyIleGluSerLysArgArgPheLeuVal-58
126-AsnGlyLeuArgGlyArgValVal-133
170-ProValArgArgAspAsnIleLeu-177

193-LeuAspSerAspGluAlaValCysArg-201
235-AlaArgProArgValThrArgValProTyrAspAspLysAlaTyr-249
259-ValSerLysArgLeuGluIle-265
285-AlaGlySerGluThrLeu-290
128-1
AMPHI Regions - AMPHI
43-AlaGlnThrHisThrGlyTrpAlaAsnThrValGluProLeuThrGlyIleThrGluArgValGlyArgIleT
rpGlyValValSerHisLeuAsnSerValAlaAspThrProGluLeu-82
85-ValTyrAsnGluLeuMetProGluIle-93
102-GlnAspIleGluLeuTyrAsnArgPheLysThrIleLysAsnSerProGluPhe-119

166-PheSerGlnAsnValLeuAspAlaThrAsp-175
189-GlyIleProGluAspAla-194
218-HisTyrLeuAlaVal-222
245-GluLeuSerAspAspGlyLysPheAspAsnThrAlaAsnIleAspArgThrLeuAlaAsnAlaLeuGlnThr
AlaLysLeuLeuGlyPheLysAsnTyrAlaGlu-279
286-MetAlaAspThrProGluGlnValLeuAsnPheLeuHisAspLeuAlaArgArgAla-304
313-AlaGluValLysAlaPheAlaArg-320
359-GlyLysValLeuAsnGlyLeuPheAlaGlnIleLysLysLeuTyrGly-374
472-LeuHisHisLeuLeuThrGlnValAspGluLeu-482
496-GluLeuProSerGlnPhe-501
565-GlyArgLeuLysAsnTrpGlnGlnValLeuAspSerVal-577
610-SerTyrAlaTrpAlaGlu-615
623-AlaAlaPheGluGluSerAspAsp-630
636-LysArgPheTrpGluIleLeuAla-644
651-AlaAlaGluSerPheLysAlaPheArg-659

Antigenic Index - Jameson-Wolf

9-LeuGlyGluGluProArgPheAspGlnIleLysThrGluAspIleLysProAlaLeu-27
32-AlaGluAlaArgGluGlnIleAla-39
43-AlaGlnThrHisThrGlyTrp-49

51-AsnThrValGluProLeuThrGlyIleThrGluArgValGlyArgIleTrp-67
75-SerValAlaAspThrProGluLeu-82

100-IleGlyGlnAspIleGluLeuTyrAsnArgPheLysThrIleLysAsnSerProGluPheAspThrLeuSer
ProAlaGlnLysThrLysLeuAsnHisAspLeuArgAsp-136
138-ValLeuSerGlyAlaGluLeuProProGluGlnGlnAlaGluLeuAlaLysLeuGlnThrGluGlyAlaGln
Leu-162
165-LysPheSerGlnAsnVal-170
172-AspAlaThrAspAla-176
190-IleProGluAspAla-194
202-AlaGlnSerGluSerLysThrGlyTyrLysIle-212
226-AlaAspAsnArgGluLeuArgGluGlnIle-235
240-ValThrArgAlaSerGluLeuSerAspAspGlyLysPheAspAsnThrAlaAsnIleAspArgThrLeu-26
2
285-LysMetAlaAspThrProGluGln-292
300-LeuAlaArgArgAlaLysProTyrAlaGluLysAspLeuAlaGlu-314

316-LysAlaPheAlaArgGluSerLeuAsn-324
335-TyrAlaSerGluLysLeuArgGluAlaLysTyrAlaPheSerGluThrGluValLysLys-354
376-GlyPheThrGluLysThrVal-382
387-LysAspValArgTyrPheGluLeuGlnGlnAsnGlyGluThrIle-401
409-TyrAlaArgGluGlyLysArgGlyGlyAla-418

420-MetAsnAspTyrLysGlyArgArgArgPheSerAspGlyThrLeu-434
447-ProProValGlyGlyArgGluAlaArgLeuSerHisAspGlu-460
478-GlnValAspGluLeuGlyVal-484
496-GluLeuProSerGln-500
516-SerAlaHisGluGluThrGlyVal-523

560-SerGluAspAspGluGlyArgLeuLysAsn-569
575-AspSerValArgLysLysValAla-582
586-ProProGluTyrAsnArg-591
605-SerAlaGlyTyrTyrSerTyr-611
625-PheGluGluSerAspAspValAlaAlaThrGlyLysArgPheTrp-639
646-GlyGlySerArgSerAlaAlaGluSerPheLysAlaPheArgGlyArgGluProSerIle-665
669-LeuArgHisSerGlyPheAspAsnAlaVal-678

Hydr**ophilic Regions** - Hopp-Woods

9-LeuGlyGluGluProArgPheAspGlnIleLysThrGluAspIleLysPro-25

32-AlaGluAlaArgGluGlnIleAla-39
59-IleThrGluArgValGly-64
77-AlaAspThrProGluLeu-82

100-IleGlyGlnAspIleGluLeu-106
111-LysThrIleLysAsnSerProGluPheAspThr-121
123-SerProAlaGlnLysThrLysLeuAsnHisAspLeuArgAsp-136
143-GluLeuProProGluGlnGlnAlaGluLeuAlaLysLeuGlnThrGluGlyAlaGlnLeu-162
190-IleProGluAspAla-194
202-AlaGlnSerGluSerLysThrGlyTyr-210
226-AlaAspAsnArgGluLeuArgGluGlnIle-235
242-ArgAlaSerGluLeuSerAspAspGlyLysPheAspAsn-254
256-AlaAsnIleAspArgThrLeu-262
285-LysMetAlaAspThrProGlu-291
300-LeuAlaArgArgAlaLysProTyrAlaGluLysAspLeuAlaGlu-314

316-LysAlaPheAlaArgGluSerLeuAsn-324
335-TyrAlaSerGluLysLeuArgGluAlaLysTyrAlaPheSerGluThrGluValLysLys-354
377-PheThrGluLysThr-381
387-LysAspValArgTyr-391
396-GlnAsnGlyGluThr-400
409-TyrAlaArgGluGlyLysArgGlyGly-417
423-TyrLysGlyArgArgArgPheSerAsp-431
449-ValGlyGlyArgGluAlaArgLeuSerHisAspGlu-460
478-GlnValAspGluLeuGly-483
516-SerAlaHisGluGluThrGly-522

560-SerGluAspAspGluGlyArgLeuLysAsn-569
575-AspSerValArgLysLysValAla-582
625-PheGluGluSerAspAspValAlaAlaThrGly-635

647-GlySerArgSerAlaAlaGluSerPheLysAlaPheArgGlyArgGluProSerIle-665
130-2
AMPHI Regions - AMPHI
16-ThrLeuValSerGlyIle-21
36-GlySerGlySerPheGly-41
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56-GlnProValGlyGlnLeu-61
91-AsnValProAsnAlaPro-96
110-GlnGlyPheAspThrLeuPheGlnHisAlaLeuAsnGlyPheAsnAlaMet-126
171-ThrAlaSerAlaPro-175
204-PheGluAlaThrCysGln-209
"

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211-CysHisGlyGlySerIleProGlyIlePro-220
234-LysGlyLysGluThr-238
"

"

245-GluGlyPheAsnAlaMet-250

"

Antigenic Index - Jameson-Wolf

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1-MetLysGlnLeuArgAspAsnLysAlaGlnGlySer-12
35-AlaGlySerGlySerPheGlyAspValAspAlaThrThrGluAlaAlaThrGlnThrArgIleGlnProValG
ly-59
63-MetGlyAspGlyIleProValGlyGluArgGlnGlyGlu-75
87-AlaAlaAspSerAsnValProAsnAlaProLysLeuGluHisAsnGlyAspTrpAla-105
108-IleAlaGlnGlyPhe-112
126-MetProAlaLysGlyGlyAla-132
"

"

134-AspLeuThrAspGlnGluLeuLysArg-142
148-AlaAsnLysSerGlyGlySerPheProAsnProAspGluAlaAlaProAlaAspAsnAlaAlaSerGlyThr
AlaSerAlaProAlaAspSerAlaAlaProAlaGluAlaLysAlaGluAspLysGlyAlaAla-192
197-GlyValAspGlyLysLysValPheGlu-205
221-GlyIleGlyLysLysAspAspTrpAlaProArgIleLysLysGlyLysGluThrLeuHis-240
"

"

251-ProAlaLysGlyGlyAsnAlaGlyLeuSerAspAspGluValLysAla-266
274-GlnSerGlyAlaLys-278
"

"

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Hydrophilic Regions - Hopp-Woods

1-MetLysGlnLeuArgAspAsnLysAlaGlnGly-11
41-GlyAspValAspAlaThrThrGluAlaAlaThr-51
"

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68-ProValGlyGluArgGlnGlyGlu-75
"

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87-AlaAlaAspSerAsnVal-92

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96-ProLysLeuGluHisAsnGly-102

"

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127-ProAlaLysGlyGlyAla-132
134-AspLeuThrAspGlnGluLeuLysArg-142
156-ProAsnProAspGluAlaAlaProAlaAspAsnAlaAla-168
174-AlaProAlaAspSerAlaAlaProAlaGluAlaLysAlaGluAspLysGlyAlaAla-192
198-ValAspGlyLysLysValPheGlu-205
222-IleGlyLysLysAspAspTrpAlaProArgIleLysLysGlyLysGluThrLeuHis-240
251-ProAlaLysGlyGlyAsn-256
258-GlyLeuSerAspAspGluValLysAla-266

132-2

AMPHI Regions - AMPHI
13-IleIleSerAlaLeuAlaVal-19
70-AlaThrCysMetAlaMetVal-76
92-ValGlnGlnThrGlnGlnAlaProLysProValSerAsnThr-105

Antigenic Index - Jameson-Wolf
26-GlnHisGlyLysGlyAlaAspAla-33
38-GlySerGlySerGlySerAla-44
81-HisThrThrLysHisGlyLeuAspPhe-89
91-AsnValGlnGlnThrGlnGlnAlaProLysProValSerAsnThrGluProSerAlaProValProGlnGlnG
lnLys-116

Hydrophilic Regions - Hopp-Woods
28-GlyLysGlyAlaAspAla-33
97-GlnAlaProLysProValSerAsnThrGluProSerAla-109

134

AMPHI Regions - AMPHI
39-IleGlnSerAlaGlyThrVal-45
47-GlyLysLysThrGly-51
58-TrpMetGluIleGluLysGlnArg-65
83-ValAsnLeuLeuAspThrProGlyHis-91
97-AspThrTyrArgValLeuThrAlaVal-105
114-AlaAlaGlyValGlu-119
123-IleLysLeuLeuAsnValCysArg-130
142-LysTyrAspArgGluVal-147
149-AspSerLeuGluLeuLeuAspGluValGluAsnIleLeuLys-162
176-LysAsnPheLysGlyValTyrHisIleLeu-185
201-HisGluPheAspIleIleLysGlyIleAspAsn-211
254-PheGlySerAlaIle-258
265-GluIleLeuAsnSerLeuIleAspTrpAlaPro-275
322-LysPheGluArgGlyMetLys-328
361-AspIleIleGlyIleProAsnHis-368
395-LeuPheArgSerValArgIleLys-402
404-ProLeuLysIleLysGln-409
411-GlnLysGlyLeuGlnGlnLeuGlyGlu-419

423-ValGlnValPheLysProMetSer-430
449-SerArgLeuAlaAsnGluTyr-455
481-AlaGluPheGluLysAlaAsn-487
515-ArgTrpProAspIle-519
Antigenic Index - Jameson-Wolf
4-GluIleLeuAspGlnValArgArgArgArgThrPhe-15
19-SerHisProAspAlaGlyLysThrThrLeuThr-29
43-GlyThrValLysGlyLysLysThrGlyLysPheAlaThr-55
57-AspTrpMetGluIleGluLysGlnArgGly-66
76-PheAspTyrLysAspHisThrVal-83
85-LeuLeuAspThrProGlyHisGlnAspPheSerGluAspThrTyrArg-100
113-AspAlaAlaLysGlyValGlu-119
129-CysArgLeuArgAspThrPro-135
140-MetAsnLysTyrAspArgGluValArgAspSerLeuGluLeuLeuAspGluValGluAsn-159
173-GlyMetGlyLysAsnPheLys-179
194-AlaGlyGlyGluArgLeuProHis-201
207-LysGlyIleAspAsnProGluLeuGluGlnArgPheProLeu-220
223-GlnGlnLeuArgAspGluIleGluLeu-231
235-AlaSerAsnGluPheAsnLeu-241
275-ProAlaProLysProArgAspAlaThrValArgMetValGluProAspGluProLysPhe-294
302-GlnAlaAsnMetAspProLysHisArgAspArgIleAla-314
317-ArgValCysSerGlyLysPheGluArgGlyMetLysMetLysHisLeuArgIleAsnArgGluIleAla-33
9
348-SerHisAspArgGluLeuValGlu-355
365-IleProAsnHisGly-369
373-IleGlyAspSerPheSerGluGlyGluGln-382
399-ValArgIleLysAsnProLeuLysIleLysGlnLeuGlnLysGlyLeuGlnGlnLeuGlyGluGluGlyAla
-422
450-ArgLeuAlaAsnGluTyrGlyVal-457
459-AlaValPheAspSer-463
473-SerCysAspAspLysLysLysLeuAlaGluPheGluLysAlaAsnAla-488
503-AlaProAsnArgValAsnLeu-509
511-LeuThrGlnGluArgTrpProAspIleVal-520
523-GluThrArgGluHisSerVal-529

Hydrophilic Regions - Hopp-Woods
4-GluIleLeuAspGlnValArgArgArgArgThr-14
21-ProAspAlaGlyLys-25
43-GlyThrValLysGlyLysLysThrGlyLys-52
59-MetGluIleGluLysGlnArgGly-66
77-AspTyrLysAspHisThr-82
92-GlnAspPheSerGluAspThrTyr-99
113-AspAlaAlaLysGlyValGlu-119
129-CysArgLeuArgAspThrPro-135
142-LysTyrAspArgGluValArgAspSerLeuGluLeuLeuAspGluValGluAsn-159
194-AlaGlyGlyGluArgLeuProHis-201
207-LysGlyIleAspAsnProGluLeuGluGlnArgPheProLeu-220
223-GlnGlnLeuArgAspGluIleGluLeu-231
277-ProLysProArgAspAlaThrValArgMetValGluProAspGluProLysPhe-294
305-MetAspProLysHisArgAspArgIleAla-314
319-CysSerGlyLysPheGluArgGlyMetLysMetLysHisLeuArgIleAsnArgGluIleAla-339
348-SerHisAspArgGluLeuValGlu-355
376-SerPheSerGluGlyGluGln-382
399-ValArgIleLysAsnProLeuLysIleLysGlnLeuGlnLysGlyLeu-414
417-LeuGlyGluGluGlyAla-422

473-SerCysAspAspLysLysLysLeuAlaGluPheGluLysAlaAsnAla-488
512-ThrGlnGluArgTrpPro-517
523-GluThrArgGluHisSerVal-529
135
AMPHI Regions - AMPHI
85-GluTyrThrAlaAsnLeu-90
169-AspIleAspGlyLeuTyrThr-175
185-ValArgLeuAspLysIleGluHis-192
212-GlyMetLeuThrLysIle-217
236-LeuLysProAspAla-240
242-AlaGluAlaAlaGlu-246
284-AlaGluHisAlaLeuSer-289
300-IleAlaGlyIleGluGly-305
308-SerArgMetAspThrValThrValTyr-316
318-LysAlaThrLysGlnPro-323

Antigenic Index - Jameson-Wolf
1-MetLysTyrLysArgIleVal-7
11-GlyThrSerSerIleThrHisSerAspGlySerLeuSerArgGlyLysIleGlnThr-29
60-GlyPheLysLysArgProValLysIleAlaAspLysGlnAlaSer-74
90-LeuSerSerAspGlyIle-95
105-AlaAspPheAlaAspLysArgArgTyrGlnAsnAlaGlyGly-118
124-LeuGlnArgArgAlaVal-129
132-IleAsnGluAsnAspThrValSerValGluGluLeuLysIleGlyAspAsnAspThrLeu-151
176-GlyAsnProAsnSerAsnProAspAlaValArgLeuAspLysIleGluHisIleAsn-194
202-GlyGlySerGlySerAlaAsnGlyThrGly-211
215-ThrLysIleLysAla-219
224-AlaGluSerGlyVal-228
233-CysSerSerLeuLysProAspAlaLeuAlaGluAlaAlaGluHisGlnAlaAspGly-251
257-ArgAlaLysGlyLeuArgThrGlnLysGln-266
271-TyrSerGluSerArgGlySerValTyrValAspGluGlyAlaGluHisAlaLeuSerGluGlnGlyLysSer
LeuLeu-296
305-GlyHisPheSerArgMetAspThr-312
317-SerLysAlaThrLysGlnProLeuGlyLysGlyArgVal-329
335-AlaAlaGluAspLeuLeuLysSerArgLysAlaLys-346
350-IleHisArgAspAspTrpIleSer-357

Hydrophilic Regions - Hopp-Woods
1-MetLysTyrLysArgIleVal-7
16-ThrHisSerAspGlySerLeuSerArgGlyLysIle-27
60-GlyPheLysLysArgProValLysIleAlaAspLysGlnAlaSer-74
105-AlaAspPheAlaAspLysArgArgTyrGlnAsn-115
124-LeuGlnArgArgAlaVal-129
133-AsnGluAsnAspThrValSerValGluGluLeuLysIleGlyAspAsnAspThrLeu-151
178-ProAsnSerAsnProAspAlaValArgLeuAspLysIleGluHisIleAsn-194
215-ThrLysIleLysAla-219
236-LeuLysProAspAlaLeuAlaGluAlaAlaGluHisGlnAlaAsp-250
257-ArgAlaLysGlyLeuArgThrGlnLys-265
272-SerGluSerArgGly-276
278-ValTyrValAspGluGlyAlaGluHisAlaLeuSerGluGlnGlyLys-293
306-HisPheSerArgMetAspThr-312
318-LysAlaThrLysGlnProLeuGlyLysGlyArgVal-329
335-AlaAlaGluAspLeuLeuLysSerArgLysAlaLys-346
351-HisArgAspAspTrp-355
136

AMPHI Regions - AMPHI
37-LeuArgPheValAspAspCysLeuPro-45
50-IleArgGlnCysIleArgGln-56
84-GlnCysHisAspGlyIleLysGlnLeuPheLysArgPheIleIleAspGlyPheLysProIleGlyArgHis-107
119-CysValLysIleAla-123
148-ArgHisCysGlnAsn-152
170-GlnHisPheGlyGlnPro-175
177-GluArgCysGlnPheVal-182
194-AsnLeuValAlaThr-198
210-GlnPheAlaGlnPro-214
216-PheGlyCysPheGlyLysPheSerGlyIleHis-226 *

Antigenic Index - Jameson-Wolf
1-MetGluThrAsnAla-5
38-ArgPheValAspAspCysLeu-44
48-ValAspIleArgGlnCysIle-54
69-LeuGlnThrAspSer-73
84-GlnCysHisAspGlyIleLysGlnLeuPhe-93
99-AspGlyPheLysProIleGlyArgHisAsnIle-109
139-IleArgHisArgGlyGlyCysPheHisArgHisCysGlnAsnGlnProPheAsp-156
159-ThrPheGlyGlyGlyLysLeuArg-166
171-HisPheGlyGlnProValGluArg-178
184-ProAlaGlnGlnArgArgHisLysThr-192
214-ProProPheGlyCysPheGlyLysPheSerGly-224
236-ProTyrTyrArgArgAsnAlaVal-243

Hydrophilic Regions - Hopp-Woods
48-ValAspIleArgGlnCysIle-54
87-AspGlyIleLysGlnLeuPhe-93
185-AlaGlnGlnArgArgHisLysThr-192
137
AMPHI Regions - AMPHI
24-LeuSerTyrIleLeuGlyPhe-30
49-ThrLysGluSerLeu-53
55-AspPheLeuThrTrpGly-60
78-PheSerAspTyrLeuAlaHisProLeuAspIlePheLysValTrpGluGlyGly-95
120-PheLeuLysLeuMetAspThrValAlaProLeuValPro-132
139-ArgIleGlyAsnPheIle-144
149-TrpGlyArgValThrAspIleAsnAlaPhe-158
178-ProLeuTrpAlaGluTrpLeuGlnGlnTyr-187
190-LeuProArgHisProSerGlnLeu-197
232-TyrGlyIlePheArgPheIleAlaGluPheAlaArgGlnProAspAspTyrLeuGly-250

Antigenic Index - Jameson-Wolf
36-LeuGlyArgArgArgIleAlaGln-43
48-PheThrLysGluSerLeuAspAsp-55
92-TrpGluGlyGlyMet-96
111-LeuPheGlyArgLysHisGly-117
136-AlaSerGlyArgIle-140
164-ProGlnAlaArgTyrGluAspAlaGluAlaAlaAla-175
191-ProArgHisProSerGlnLeu-197
214-PheSerLysLysGlnArgSerThrGlyGln-223
241-PheAlaArgGlnProAspAspTyrLeu-249
277-PheGlyMetLysLysGlnHis-283

Hydrophilic Regions - Hopp-Woods
37-GlyArgArgArgIleAla-42
48-PheThrLysGluSerLeuAsp-54
112-PheGlyArgLysHisGly-117
166-AlaArgTyrGluAspAlaGluAlaAlaAla-175
216-LysLysGlnArgSerThrGly-222
241-PheAlaArgGlnProAspAspTyr-248
278-GlyMetLysLysGlnHis-283
138
AMPHI Regions - AMPHI
21-ProTyrIleArgArgPheSerGlySer-29
74-AsnAlaMetLeuGluLysVal-80
85-GluPheValGlnGlyMet-90
109-ValAsnLysGluIleValSerMetIleAsnThrTyrGly-121
152-IleGlyGlnValGlyThrValGluSerIle-161
163-ThrGlyLeuValLysGlyLeu-169
199-GlyLysLeuAlaGluGluLeu-205
213-MetThrAsnIleAlaGlyValMetAspLysThrGlyAsnLeuLeuThrLysLeuThr-231
234-ArgIleAspGluLeuIle-239
247-GlyMetLeuProLysIleAlaSerAlaValGluAlaAlaValAsn-261
276-AlaLeuLeuLeuGluIlePheThrAspAla-285

Antigenic Index - Jameson-Wolf
1-MetGluSerGluAsnIle-6
9-AlaAlaAspLysAlaArgIleLeu-16
23-IleArgArgPheSerGlySer-29
35-TyrGlyGlyAsnAlaMetThr-41
43-ProAlaLeuLysGluGlyPheAla-50
68-GlyGlyGlyProGln-72
76-MetLeuGluLysValGlyLysLysGlyGluPhe-86
91-ArgValThrAspLysGluAlaMetAsp-99
109-ValAsnLysGluIle-113
128-SerGlyArgAspAspHisPheIleLysAlaLysLysLeuLeuIleAspThrProGluGlnAsnGlyValAsp
IleGlyGln-154
159-GluSerIleAspThrGlyLeu-165
169-LeuIleGluArgGlyCysIle-175
182-GlyValGlyGluLysGlyGluAla-189
200-LysLeuAlaGluGluLeuAsnAlaGluLys-209
219-ValMetAspLysThrGlyAsnLeuLeuThrLysLeuThrProLysArgIleAspGluLeuIleAla-240
259-AlaValAsnGlyValLys-264
269-IleAspGlyArgLeuProAsnAla-276
292-LeuGlyGlyGlyGluAspAla-298

Hydrophilic Regions - Hopp-Woods
1-MetGluSerGluAsn-5
9-AlaAlaAspLysAlaArgIleLeu-16
43-ProAlaLeuLysGluGlyPheAla-50
76-MetLeuGluLysValGlyLysLysGlyGluPhe-86
91-ArgValThrAspLysGluAlaMetAsp-99
109-ValAsnLysGluIle-113
128-SerGlyArgAspAspHisPheIleLysAlaLysLysLeuLeuIleAspThrProGluGlnAsnGlyValAsp
-151
183-ValGlyGluLysGlyGluAla-189
200-LysLeuAlaGluGluLeuAsnAlaGluLys-209

219-ValMetAspLysThrGly-224
230-LeuThrProLysArgIleAspGluLeuIleAla-240
269-IleAspGlyArgLeu-273
294-GlyGlyGluAspAla-298
140-2
AMPHI Regions - AMPHI
23-ThrThrLeuSerAlaCysLeuGly-30
105-AspPheProAsnProAsnAspAlaTyrLysAsnLeuIle-117
139-ThrGlyGluSerValGlySerIleSerPhePro-149
201-AspIleArgHisValLysGluIleGlyHisIleAspLeuValSer-215
253-AlaAlaIleArgAsnAlaTrpValLysLeuGly-263
266-GlyValArgIleVal-270
282-ThrAlaAspLeuPheGlnIle-288
311-GlyIleArgLeuMetGlnGlnSerAsp-319
370-AspArgSerGlyGluLysPheLysArgGluMetTyr-381
415-ThrArgThrAsnPro-419
458-ThrAlaGlnAspIle-462
476-LeuAspAlaGlyLysAlaMetAsnGlyPro-485
608-TyrThrArgLeuGlyLysLeuLeuLys-616
673-SerLeuAspSerValGluLysThrAlaGly-682
696-AsnAlaAlaArgThrAlaSer-702
736-SerAlaThrProGluThrValGluThrAlaAla-746
763-ArgAlaAlaAlaAlaValGlnHisAlaAsnAlaAlaAspGlyValArgIlePheAsnSerLeuAlaAlaThr
-786
803-LeuLysAlaValSerAspGlyLeuAsp-811
817-LeuArgValIleAlaGln-822
882-SerLeuPheAlaGly-886

894-IleGlyTyrLeuLysGlyLeuPheSerTyr-903
918-GluHisAlaGluGlySer-923
931-LeuGlyAlaLeuGly-935
980-GlyThrLeuValGlyLeu-985
1019-GlyGlyPheThrGlyAlaThr-1025
1040-ArgLeuValAlaGlyLeu-1045
1053-AsnGlyTrpAsnGlyLeuAlaArg-1060

Antigenic Index - Jameson-Wolf
1-MetArgThrThrPro-5
7-PheProThrLysThrPheLysProThr-15
30-GlyGlyGlyGlyGlyGlyThrSerAlaProAspPheAsnAlaGlyGlyThrGlyIleGlySerAsnSerArgA
laThrThrAlaLys-58
67-IleLysAsnGluMetCysLysAspArgSerMet-77
79-CysAlaGlyArgAspAspValAlaValThrAspArgAspAlaLysIleAsnAlaProProProAsnLeuHisT
hrGlyAspPheProAsnProAsnAspAlaTyrLysAsn-115
127-TyrThrGlyArgGlyValGlu-133
138-AspThrGlyGluSerValGlySerIleSerPhe-148
151-LeuTyrGlyArgLysGluHisGlyTyrAsnGluAsnTyrLysAsn-165
170-MetArgLysGluAlaProGluAspGlyGlyGlyLysAspIleGluAlaSerPheAspAspGluAlaValIle
GluThrGluAlaLysProThrAspIleArgHisValLysGluIleGlyHis-210
220-GlyArgSerValAspGlyArgProAlaGlyGlyIleAlaProAspAla-235
241-AsnThrAsnAspGluThrLysAsnGluMet-250
262-LeuGlyGluArgGlyValArg-268
272-AsnSerPheGlyThrThrSerArgAlaGlyThrAlaAsp-284
288-IleAlaAsnSerGluGluGlnTyrArg-296
301-AspTyrSerGlyGlyAspLysThrAspGluGlyIleArg-313

315-MetGlnGlnSerAspTyrGlyAsn-322
327-IleArgAsnLysAsnMet-332
337-SerThrGlyAsnAspAlaGlnAlaGlnProAsnThr-348
355-TyrGluLysAspAlaGlnLys-361
368-GlyValAspArgSerGlyGluLysPheLysArgGluMetTyrGlyGluProGlyThrGluProLeuGluTyr
GlySerAsnHis-395
412-ValArgPheThrArgThrAsnPro-419
446-MetSerAsnAspAsnLeuArgThr-453
467-ValAspSerLysPheGly-472
477-AspAlaGlyLysAlaMetAsnGlyProAla-486
492-AspPheThrAlaAspThrLysGlyThrSer-501
506-SerPheArgAsnAspIleSerGlyThr-514
516-GlyLeuIleLysLysGlyGlySerGln-524
529-GlyAsnAsnThrTyrThrGlyLysThrIleIleGluGlyGlySer-543
548-GlyAsnAsnLysSerAspMetArgValGluThrLysGly-560
568-AlaSerGlyGlySerLeuAsnSerAspGly-577
582-AlaAspThrAspGlnSerGlyAlaAsnGlu-591
593-ValHisIleLysGlySerLeuGlnLeuAspGlyLysGlyThrLeu-607
615-LeuLysValAspGly-619
629-MetSerAlaArgGlyLysGlyAlaGly-637
640-AsnSerThrGlyArgArgValPro-647
653-LysIleGlyGlnAspTyr-658
663-AsnIleGluThrAspGlyGlyLeu-670
675-AspSerValGluLysThrAlaGlySerGluGlyAspThrLeu-688
691-TyrValArgArgGlyAsnAlaAlaArgThrAlaSer-702
714-HisAlaValGluGlnGlyGlySerAsnLeuGlu-724
730-LeuAspAlaSerGluSerSerAlaThrProGluThrValGlu-743
745-AlaAlaAlaAspArgThrAspMetProGlyIleArgProTyrGly-759
772-AsnAlaAlaAspGly-776
788-TyrAlaAspSerThrAlaAla-794
797-AspMetGlnGlyArgArgLeuLysAlaValSerAspGlyLeuAspHisAsnGlyThrGlyLeu-817
823-ThrGlnGlnAspGlyGlyThrTrpGluGlnGlyGlyValGluGlyLysMetArgGlySerThrGln-844
849-AlaAlaLysThrGlyGluAsnThrThr-857
863-GlyMetGlyArgSerThrTrpSerGluAsnSerAlaAsnAlaLysThrAspSerIle-881
887-IleArgHisAspAlaGlyAsp-893
902-SerTyrGlyArgTyrLysAsnSerIleSerArgSerThrGlyAlaAspGluHisAlaGluGlySerValAsn
-925
943-AlaThrGlyAspLeuThrValGluGlyGlyLeuArg-954
961-AspAlaPheAlaGluLysGlySerAlaLeuGlyTrpSerGlyAsnSerLeuThrGluGlyThr-981
990-LeuSerGlnProLeuSerAspLys-997
1005-GlyValGluArgAspLeuAsnGlyArgAspTyrThrVal-1017
1027-AlaThrGlyLysThrGlyAlaArgAsnMetProHisThr-1039
1049-ValGluPheGlyAsnGlyTrp-1055
1062-SerTyrAlaGlySerLysGlnTyrGlyAsnHisSerGlyArgValGlyVal-1078

Hydrophilic Regions - Hopp-Woods
50-SerAsnSerArgAlaThrThrAlaLys-58
67-IleLysAsnGluMetCysLysAspArgSerMet-77
80-AlaGlyArgAspAspValAlaValThrAspArgAspAlaLysIleAsnAla-96
106-PheProAsnProAsnAspAlaTyr-113
138-AspThrGlyGluSerValGly-144
152-TyrGlyArgLysGluHisGlyTyr-159
170-MetArgLysGluAlaProGluAspGlyGlyGlyLysAspIleGluAlaSerPheAspAspGluAlaValIle
GluThrGluAlaLysProThrAspIleArgHisValLysGluIleGlyHis-210
221-ArgSerValAspGlyArgProAlaGly-229

242-ThrAsnAspGluThrLysAsnGluMet-250
262-LeuGlyGluArgGlyValArg-268
278-SerArgAlaGlyThr-282
290-AsnSerGluGluGlnTyrArg-296
303-SerGlyGlyAspLysThrAspGluGlyIleArg-313

327-IleArgAsnLysAsn-331
339-GlyAsnAspAlaGlnAla-344
355-TyrGluLysAspAlaGlnLys-361
368-GlyValAspArgSerGlyGluLysPheLysArgGluMetTyrGly-382
384-ProGlyThrGluProLeuGlu-390
412-ValArgPheThrArg-416
477-AspAlaGlyLysAlaMetAsn-483
493-PheThrAlaAspThrLysGlyThrSer-501
509-AsnAspIleSerGly-513
517-LeuIleLysLysGlyGlySer-523
550-AsnLysSerAspMetArgValGluThrLysGly-560
583-AspThrAspGlnSerGlyAlaAsnGlu-591
601-LeuAspGlyLysGly-605
615-LeuLysValAspGly-619
631-AlaArgGlyLysGly-635
642-ThrGlyArgArgValPro-647
664-IleGluThrAspGly-668
675-AspSerValGluLysThrAlaGlySerGluGlyAspThr-687
692-ValArgArgGlyAsnAlaAlaArgThrAlaSer-702
714-HisAlaValGluGlnGlyGlySerAsnLeu-723
730-LeuAspAlaSerGluSerSerAlaThrProGluThrValGlu-743
745-AlaAlaAlaAspArgThrAspMetProGly-754
772-AsnAlaAlaAspGly-776
797-AspMetGlnGlyArgArgLeuLysAlaValSerAspGlyLeuAspHisAsnGlyThr-815
833-GlyGlyValGluGlyLysMetArgGlySerThr-843
851-LysThrGlyGluAsnThrThr-857
872-AsnSerAlaAsnAlaLysThrAspSer-880
887-IleArgHisAspAlaGlyAsp-893
905-ArgTyrLysAsnSerIleSerArgSerThrGlyAlaAspGluHisAlaGluGlySerVal-924
961-AspAlaPheAlaGluLysGlySer-968
992-GlnProLeuSerAspLys-997
1005-GlyValGluArgAspLeuAsnGlyArgAspTyrThr-1016
1027-AlaThrGlyLysThrGlyAlaArgAsnMetPro-1037
141
AMPHI Regions - AMPHI
11-GlnSerSerThrMetArgProIleGlyGluIle-21
44-ProAlaGluAlaPheLysLeuPro-51
80-AlaAspAlaLeuArgHisIle-86
131-PheHisAlaIleGlyAla-136

139-AsnLeuLeuAlaAlaMetLeuAspAsn-147
174-GlnLeuArgAsnIleIleAspGlyMetGlyLysProValAspGlyValMetArgPro-192
212-AspIleSerAspLeuLysGluArgLeuGlyIleLeuVal-225
245-MetAlaAlaLeuLeuLysAspAlaIleLysProAsnLeu-257

259-GlnThrIleGluGlyThrPro-265

272-ProPheAlaAsnIleAlaHisGlyCysAsnSerValThrAlaThrArgLeuAlaLysHisLeuAlaAspTyr
Ala-296

330-AlaThrValArgAla-334

351-LeuAspAlaLeuGluLysGlyLeuProAsnLeuLeuLysHisIleSerAsnLeuLysAsnValPheGly-37
3

406-SerLeuThrGluValTrpGlyLys-413

420-AspLeuAlaArgLysValValAsnAlaIleGluSerGln-432
473-IleAlaSerLeuGluLys-478
525-ValAlaLeuCysGlyAsnMetMetLysMetProGlyLeuProLysValProAlaAla-543

Antigenic Index - Jameson-Wolf
3-PheLysThrAspAlaGluIleAlaGlnSerSerThrMetArgProIleGly-19

27-LeuAsnAlaAspAsnIleGluProTyrGly-36
38-TyrLysAlaLysIleAsnProAlaGluAlaPheLysLeuProGlnLysGlnGlyArg-56
64-AsnProThrProAlaGlyGluGlyLysThrThr-74
81-AspAlaLeuArgHisIleGlyLysAspAla-90
94-LeuArgGluProSerLeuGlyPro-101
105-ValLysGlyGlyAlaAlaGlyGlyGly-113
151-GlnGlyAsnGluLeuAsnIleAspProLysArgValLeuTrp-164
166-ArgValValAspMetAsnAspArgGlnLeuArgAsnIleIleAspGlyMetGlyLysProValAspGlyVal
MetArgProAspGlyPheAspIle-197
211-LysAspIleSerAspLeuLysGluArgLeuGly-221
227-TyrAlaLysAspGlySerProValTyr-235
237-LysAspLeuLysAlaAsnGly-243
251-AspAlaIleLysProAsnLeu-257
287-ArgLeuAlaLysHisLeuAla-293
306-LeuGlyAlaGluLysPheCysAspIleLysCysArgLeuAlaGlyLeuLysProAspAla-325
335-LeuLysTyrAsnGlyGlyValGluArgAlaAsnLeuGlyGluGluAsnLeuAspAlaLeuGluLysGlyLeu
ProAsnLeu-361
383-PheValSerAspAlaAspAlaGluLeuAlaMetIleGluLysAlaCysAla-399
411-TrpGlyLysGlyGlyAlaGlyGlyAlaAspLeuAlaArgLysValValAsn-427
429-IleGluSerGlnThrAsnAsnPheGly-437
444-LeuGlyIleLysAspLysIleArgAlaIleAla-454
458-TyrGlyAlaGluAspValAspPheSerAla-467
474-AlaSerLeuGluLysLeuGlyLeuAspLysMetPro-485
494-SerLeuSerAspAsnAlaLys-500
503-GlyCysProGluAspPheArgIle-510
534-MetProGlyLeuPro-538
541-ProAlaAlaGluLysIleAspValAspAlaGluGly-552

Hydrophilic Regions - Hopp-Woods
3-PheLysThrAspAlaGluIleAlaGln-11

38-TyrLysAlaLysIleAsnPro-44
46-GluAlaPheLysLeuProGlnLysGlnGlyArg-56
67-ProAlaGlyGluGlyLysThr-73
81-AspAlaLeuArgHisIleGlyLysAspAla-90
94-LeuArgGluProSer-98
155-LeuAsnIleAspProLysArgValLeuTrp-164
166-ArgValValAspMetAsnAspArgGlnLeuArgAsnIleIle-179
181-GlyMetGlyLysProValAspGlyValMetArgProAspGlyPhe-195
211-LysAspIleSerAspLeuLysGluArgLeuGly-221
228-AlaLysAspGlySer-232

237-LysAspLeuLysAla-241
287-ArgLeuAlaLysHisLeuAla-293
306-LeuGlyAlaGluLysPheCysAspIleLysCysArgLeuAlaGlyLeuLysProAspAla-325
339-GlyGlyValGluArgAlaAsnLeuGlyGluGluAsnLeuAspAlaLeuGluLysGlyLeu-358
383-PheValSerAspAlaAspAlaGluLeuAlaMetIleGluLysAlaCysAla-399
420-AspLeuAlaArgLysValValAsn-427
444-LeuGlyIleLysAspLysIleArgAlaIleAla-454
458-TyrGlyAlaGluAspValAspPheSerAla-467
474-AlaSerLeuGluLysLeuGlyLeuAspLysMetPro-485
503-GlyCysProGluAspPheArgIle-510
541-ProAlaAlaGluLysIleAspValAspAlaGluGly-552

142-2

AMPHI Regions - AMPHI
26-ArgPheAlaAlaMetProAspValValGlyLys-36
44-GlyGlnProGlyLysMetPhe-50
100-AlaValThrProCysArg-105
107-ValCysArgAspAspMet-112
130-PheLeuGlnIleArgHisPheSerProLeu-139
174-LeuArgValGlnArgIleLeuAspPheGlyLysPheCysGlnGlnVal-189
202-LeuAspSerValValAlaPheValHisPhePheAlaAspPheLeuIle-217
239-AlaAspAsnGlnThrArgPhePheLysAlaGly-249
259-AsnAlaArgLeuIleArgGlnIleLeuLys-268

Antigenic Index - Jameson-Wolf
31-ProAspValValGly-35
38-LeuPheGlyArgGlnAlaGlyGlnProGlyLysMet-49
59-GlnArgIleAspAlaGluAlaAlaValPheArgGlnAspArgAsnAspSerArgThrProValAspAlaGlnH
isHisGlyArgArgLeuValGlyAsnArgArgAspArgArgHisCysAsnAla-100
102-ThrProCysArgThrValCysArgAspAspMetAsnAlaCysArgAlaArgCysHisArgIleThrGluArg
SerLeu-127
147-AlaAlaHisLysAlaSerPro-153
155-CysSerSerPheAspSerLysSerArgArgSerAspValSerAlaArgTyr-171
180-LeuAspPheGlyLysPheCys-186
225-GlnLeuGlnLysAsnThrSer-231
237-PheGlnAlaAspAsnGlnThrArgPhePheLysAlaGlyGlnAspThrGlyGlnAlaGlyAlaGlnAsn-25
9
267-LeuLysValGlnArgAlaValPheArgGlnLysThrAspAsnProPro-282
291-IleGlnAsnArgProGluLeuGlyHisGlnGly-301
307-GlnThrAspIleAspArgArgMetPhe-315

Hydrophilic Regions - Hopp-Woods
42-GlnAlaGlyGlnPro-46
59-GlnArgIleAspAlaGluAlaAlaValPheArgGlnAspArgAsnAspSerArgThrProValAspAlaGlnH
isHisGlyArgArgLeuValGlyAsnArgArgAspArgArgHisCys-98
106-ThrValCysArgAspAspMetAsnAlaCysArgAlaArgCysHisArgIleThrGluArgSerLeu-127
147-AlaAlaHisLysAlaSerPro-153
158-PheAspSerLysSerArgArgSerAspValSerAla-169
237-PheGlnAlaAspAsnGlnThrArgPhePheLysAlaGlyGlnAspThrGlyGln-254
267-LeuLysValGlnArgAlaValPheArgGlnLysThrAspAsn-280
291-IleGlnAsnArgProGluLeuGly-298
309-AspIleAspArgArgMetPhe-315

144-2

AMPHI Regions - AMPHI
36-LeuGlyGlyIleValGlnGluPhe-43
45-ValLeuAlaAspGlyValArg-51

71-IleAsnLysGlnIleGlyArgValAlaGlyArg-81
136-SerAlaAspGlyTyr-140
212-SerAspAspLeuGluValPheAspPheSerArgProLys-224 *
234-ArgArgGluThrGlyArgAlaGlyPhe-242
244-AlaTyrArgValProSerAspIleGlyArgProAlaAla-257
283-ProGlnAspPheAlaArg-288
295-AspAlaLeuAlaThr-299
306-AspSerLeuAsnTrpProGluPheGlyAsn-315

Antigenic Index - Jameson-Wolf
1-MetSerAspThrProAlaThrArgAspPheGlyLeuIleAspGlyArgAla-17
23-LeuSerAsnArgArgGlyThrArg-30
48-AspGlyValArgGlu-52
58-PheAspAspAlaAlaSerTyrAlaAspAsnProPheGlnIleAsn-72
78-ValAlaGlyArgIleArgGlyAlaAla-86
88-AspIleAsnGlyArgThrTyrArgValGluAlaAsnGluGlyArgAsnAlaLeuHisGlyGlySerHis-110
121-AlaAlaAspGlyArgSerValValLeu-129
131-SerArgLeuGlnGlnSerAlaAspGlyTyrProAsnAspLeuAspLeuAspIleSerTyrArgLeuAspGlu
AspAspArgLeuThrVal-160
199-MetProAlaAspAlaGluLysLeuPro-207
210-ThrValSerAspAspLeuGluValPheAspPheSerArgProLysProLeuAsp-227
232-AlaLeuArgArgGluThrGlyArgAlaGlyPheAspAspAlaTyrArgValProSerAspIleGlyArgPro
-255
261-AlaGlyArgArgArgArgIleSerIleTyrSerAspArgAsnGly-275
282-AlaProGlnAspPheAlaArgHisAspAlaGlyVal-293
300-GluAlaGlnThrLeuProAspSerLeuAsnTrpProGlu-312
314-GlyAsnIleArgLeuAsnLysGlyAspThrArgGluAlaThr-327

Hydrophilic Regions - Hopp-Woods
1-MetSerAspThrProAlaThrArgAsp-9
24-SerAsnArgArgGlyThrArg-30
48-AspGlyValArgGlu-52
58-PheAspAspAlaAlaSer-63
78-ValAlaGlyArgIleArgGlyAlaAla-86
89-IleAsnGlyArgThrTyrArgValGluAlaAsnGluGlyArgAsnAlaLeu-105
121-AlaAlaAspGlyArgSerValValLeu-129
131-SerArgLeuGlnGlnSerAlaAspGlyTyrProAsnAspLeuAspLeu-146
150-TyrArgLeuAspGluAspAspArgLeuThrVal-160
199-MetProAlaAspAlaGluLysLeuPro-207
210-ThrValSerAspAspLeuGluVal-217
221-SerArgProLysProLeuAsp-227
232-AlaLeuArgArgGluThrGlyArgAlaGlyPheAspAspAlaTyrArgValProSerAspIleGlyArg-25
4
261-AlaGlyArgArgArgArgIleSerIleTyrSerAspArgAsnGly-275
285-AspPheAlaArgHisAspAlaGlyVal-293
317-ArgLeuAsnLysGlyAspThrArgGluAlaThr-327
146
AMPHI Regions - AMPHI
19-LysGlnTyrGlyLeuLeuAspPheMetProCys-29
24-ProLeuAspAsnPheProThrVal-41
69-ValAlaAsnLeuArgArg-74
95-LeuArgAlaCysAlaValIleValAlaLysTyrValGlyValPheGlnLys-111
140-AlaArgArgValArg-144
158-ArgHisGlnArgGlyPheAlaArg-165
191-ProIleValSerGlnTrpThrPro-198

Antigenic Index - Jameson-Wolf
6-LeuArgSerArgGlnValValIleAspHisAspLysValLysGln-20
30-LeuArgGlnProProLeuAspAsn-37
41-ValArgProAlaSerValGluAlaArgGlyLysTyrValGluArgArgArgGlnAspLysAspAlaAspGlyP
heGlyGlnArg-68
70-AlaAsnLeuArgArgAlaLeu-76
86-AlaCysArgArgGlnArgIleHisThr-94
112-SerPheLeuArgAspLysArgLeuLys-120
138-ArgArgAlaArgArgValArgHisGlyAsnAlaGln-149
155-GlnGlnProArgHisGlnArgGlyPheAla-164
166-AlaGlySerGlyArgAsnAspLysAspValAlaPheSerIle-179

Hydrophilic Regions - Hopp-Woods
6-LeuArgSerArgGlnValValIleAspHisAspLysValLysGln-20
44-AlaSerValGluAlaArgGlyLysTyrValGluArgArgArgGlnAspLysAspAlaAspGlyPheGly-66
70-AlaAsnLeuArgArgAlaLeu-76
86-AlaCysArgArgGlnArgIleHisThr-94
113-PheLeuArgAspLysArgLeuLys-120
138-ArgArgAlaArgArgValArgHisGlyAsn-147
156-GlnProArgHisGlnArgGlyPheAla-164
167-GlySerGlyArgAsnAspLysAspValAla-176
148
AMPHI Regions - AMPHI
25-AlaAspLysIleArgLysIleGluAsnTrpPro-35
49-GlnSerAlaGluTyrPheArgLeuLeuValAspLeu-60
150-AlaGlyLeuGluLeuIleArgLysLeuGlyGlyGluIle-162
165-AlaAlaAlaIleLeuGluPheThrAspLeuGlnGlyGlyLysAsnIleArg-181

Antigenic Index - Jameson-Wolf
4-LysThrSerAsnLeu-8
24-LeuAlaAspLysIleArgLysIleGluAsnTrpProGlnLysGly-38
66-MetAspGlnLysIleAspIle-72
76-LeuAspAlaArgGly-80
97-ProIleArgLysLysGlyLysLeuPro-105
117-TyrGlyGluAlaAlaVal-122
124-IleHisThrAspAlaValLysLeuGlySer-133
153-GluLeuIleArgLysLeuGlyGlyGluIleValGlu-164
172-ThrAspLeuGlnGlyGlyLysAsnIleArgAlaSerGlyAlaPro-186
192-GlnAsnGluGlyCysMetLysGly-199

Hydrophilic Regions - Hopp-Woods
24-LeuAlaAspLysIleArgLysIleGluAsnTrpPro-35
66-MetAspGlnLysIleAspIle-72
97-ProIleArgLysLysGlyLysLeuPro-105
117-TyrGlyGluAlaAlaVal-122
124-IleHisThrAspAlaValLysLeuGlySer-133
153-GluLeuIleArgLysLeuGlyGlyGluIleValGlu-164
178-LysAsnIleArgAlaSerGly-184
195-GlyCysMetLysGly-199
149-2
AMPHI Regions - AMPHI
78-AsnLeuGlyAspAlaLeuAspGlyValProGlyIle-89
107-ThrGlyArgArgIleLysValLeuAsnHisHisGlyGluThrGlyAspMet-123
141-GlnValGluIleLeuArgGlyProValThr-150

158-ValAlaGlyLeuValAsp-163
170-ProGluLysMetProGluAsnGlyVal-178
190-AsnLeuGluLysLeu-194
226-TyrArgAsnLeuLysArgLeuProAspSerHis-236
351-PheProGlyPheGlu-355
372-AlaGlyAspAlaValGluAsnPhePheAsnAsn-382
395-ProIleGlyArgLeuLys-400
415-LeuSerAlaIleSerGluAlaVal-422
571-ArgPheGlyAsnTyrIleTyrAlaGln-579
582-AsnAspGlyArgGlyProLysSerIleGluAsp-592
633-ArgGlyArgLeuLysAsnLeuProSer-641

Antigenic Index - Jameson-Wolf
1-MetArgArgGluAlaLysMetAla-8
31-HisGluThrGluGlnSerValAspLeuGluThr-41
46-GlyLysSerArgProArgAlaThrSerGly-55
61-ThrAlaSerAspLysIleIleSerGlyAspThrLeuArgGlnLysAla-76
103-IleArgGlyGlnThrGlyArgArgIleLysVal-113
115-AsnHisHisGlyGluThrGlyAspMetAlaAspPheSerProAspHis-130
143-GluIleLeuArgGlyPro-148
163-AspValAlaAspGlyLysIleProGluLysMetProGluAsnGlyValSerGlyGluLeuGlyLeu-184
186-LeuSerSerGlyAsnLeuGluLysLeuThrSerGlyGly-198
213-GlyLeuTyrArgLysSerGlyAspTyrAlaValProArgTyrArgAsnLeuLysArgLeuProAspSerHis
AlaAspSerGlnThrGly-242
250-GlyGluLysGlyPhe-254
258-AlaTyrSerAspArgArgAspGlnTyrGly-267
269-ProAlaHisSerHisGluTyrAspAspCysHisAla-280
287-SerLeuIleAsnLysArgTyrLeu-294
301-LeuThrGluGluAspIleAspTyrAspAsnProGlyLeu-313
316-GlyPheHisAspAspAspAsnAlaHis-324
326-HisThrHisSerGlyArgProTrpIleAspLeuArgAsnLysArgTyrGluLeuArgAlaGluTrpLysGln
ProPheProGly-353
360-HisLeuAsnArgAsnAspTyrArgHisAspGluLysAlaGlyAspAlaVal-376
380-PheAsnAsnGlnThrGlnAsnAlaArgIleGluLeuArgHisGlnProIleGlyArgLeuLysGlySerTrp
-403
408-LeuGlnGlnLysSerSerAla-414
428-LeuAspAsnLysVal-432
443-AlaAsnTrpAspAsnPheThrLeuGluGlyGlyValArgValGluLysGlnLysAlaSerIleGlnTyrAsp
LysAlaLeuIleAspArgGluAsnTyrTyrAsnHisProLeuProAsp-482
484-GlyAlaHisArgGlnThrAla-490
512-SerHisGlnGluArgLeuProSerThrGlnGluLeuTyrAlaHisGly-527
537-ValGlyAsnLysHisLeuAsnLysGluArgSerAsnAsnIle-550
556-TyrGluGlyAspArgTrpGln-562
568-TyrArgAsnArgPheGlyAsn-574
580-ThrLeuAsnAspGlyArgGlyProLysSerIleGluAspAspSerGluMetLysLeu-598
600-ArgTyrAsnGlnSerGlyAlaAspPheTyrGlyAlaGluGly-613
615-IleTyrPheLysProThrProArgTyrArgIle-625
627-ValSerGlyAspTyrValArgGlyArgLeuLysAsnLeuProSerLeuProGlyArgGluAspAlaTyrGly
AsnArgPro-653
655-IleAlaGlnAspAspGlnAsnAlaProArgValProAla-667
677-SerLeuThrAspArgIleAspAla-684
695-AsnLysLeuAlaArgTyrGluThrArgThrProGlyHis-707
713-GlyAlaAsnTyrArgArgAsnThrArgTyrGlyGluTrp-725
731-AlaAspAsnLeuLeu-735
745-PheLeuSerAspThrProGlnMetGlyArgSerPheThrGlyGlyVal-760

Hydrophilic Regions - Hopp-Woods
1-MetArgArgGluAlaLysMetAla-8

31-HisGluThrGluGlnSerValAspLeuGluThr-41
46-GlyLysSerArgProArgAlaThr-53
61-ThrAlaSerAspLysIleIleSer-68
70-AspThrLeuArgGlnLysAla-76
106-GlnThrGlyArgArgIleLysVal-113
118-GlyGluThrGlyAspMetAlaAspPheSerPro-128
163-AspValAlaAspGlyLysIleProGluLysMetProGluAsnGlyValSer-179
187-SerSerGlyAsnLeuGluLysLeuThr-195
213-GlyLeuTyrArgLysSerGlyAsp-220
225-ArgTyrArgAsnLeuLysArgLeuProAspSerHisAlaAspSerGlnThr-241
259-TyrSerAspArgArgAspGlnTyr-266
273-HisGluTyrAspAspCysHisAla-280
301-LeuThrGluGluAspIleAspTyrAspAsn-310
317-PheHisAspAspAspAsnAlaHis-324
336-LeuArgAsnLysArgTyrGluLeuArgAlaGluTrp-347
360-HisLeuAsnArgAsnAspTyrArgHisAspGluLysAlaGlyAspAlaVal-376
384-ThrGlnAsnAlaArgIleGluLeuArgHis-393
397-GlyArgLeuLysGly-401
452-GlyGlyValArgValGluLysGlnLysAla-461
468-AlaLeuIleAspArgGluAsnTyr-475
484-GlyAlaHisArgGlnThrAla-490
512-SerHisGlnGluArgLeuProSer-519
541-HisLeuAsnLysGluArgSerAsnAsn-549
556-TyrGluGlyAspArgTrp-561
581-LeuAsnAspGlyArgGlyProLysSerIleGluAspAspSerGluMetLysLeu-598
609-TyrGlyAlaGluGly-613
619-ProThrProArgTyrArgIle-625
630-AspTyrValArgGlyArgLeuLysAsn-638
643-ProGlyArgGluAspAlaTyrGly-650
655-IleAlaGlnAspAspGlnAsnAlaProArgValProAla-667
677-SerLeuThrAspArgIleAspAla-684
696-LysLeuAlaArgTyrGluThrArgThrProGly-706
715-AsnTyrArgArgAsnThrArgTyrGly-723
150-2
AMPHI Regions - AMPHI
20-IleThrGlnLeuLeuSerGlyLeuAsp-28
80-ValAlaAspLysAlaAlaAspSerLeuGlu-89
138-AsnGlyLysLysAlaProLysLeu-145
159-SerTyrProAsnPheCysGlnAlaGlyLysAspPheAspArgArgPheGlu-175
198-AlaTrpThrAspAsnIleAla-204
223-ThrProProAlaGlyLeuGln-229
293-ArgGluIleLeuAspLeuLeu-299
316-ValAlaArgAlaLeuSer-321
333-PheValLysGlyTyrAlaAlaPheAlaHisTyrGluGluLeuAspLysIleIle-350
365-IleValAspValLeuHisArgPheProAlaSerLeu-376
379-GluGlnPheIleArgLeuLeuArgProLeuAla-389
468-GlyValAlaProPheArg-473
505-ThrGluTrpGlnGlnPheAlaLys-512
537-IleArgGluGlnAla-541
560-AlaAlaLysMetAlaLysAspValGluAlaAlaLeuLeuAspValIle-575

588-GluTyrLeuAspMetLeuArgGluGlu-596

Antigenic Index - Jameson-Wolf
1-MetSerGluHisAspMetGlnAsnThrAsnProPro-12
16-LeuProProGluIle-20
42-LysAlaGlyAsnGlyAlaSerAlaGlyLeu-51
72-SerGlnThrGlyAsnAlaLysSerValAlaAspLysAlaAlaAspSerLeuGlu-89
96-SerArgAlaGluLeuLysAspTyrLysAlaLysAsnIleAlaGlyGluArgArgLeu-114
118-ThrSerThrGlnGlyGluGlyGluProProLysGluAlaValVal-132
137-LeuAsnGlyLysLysAlaProLysLeuAspLys-147
154-GlyLeuGlyAspSerSerTyrProAsnPheCysGlnAlaGlyLysAspPheAspArgArgPheGluGluLeu
GlyAlaLysArgLeuLeuGluArgValAspAlaAspLeuAspPhe-192
207-LeuLysGluGluAlaAlaLysAsnArgAlaThrProAlaProGlnThrThrProProAlaGlyLeuGlnThr
AlaProAspGlyArgTyrCysLys-238
250-GlnLysIleThrAlaArgGlnSerAspLysAspValArgHisIleGluIleAspLeuSerGlySerAspLeu
-273
276-LeuProGlyAspAla-280
285-PheAspAsnAspProAlaLeuVal-292
302-AspProAlaThrGluIleGlnAlaGlyGlyLysMetMetPro-315
324-PheGluLeuThrGlnAsnThrProAlaPhe-333
344-GluGluLeuAspLysIleIleAla-351
397-SerAlaGlnAlaGluValGlyAspGluValHis-407
415-PheGluHisGluGlyArgAlaArgThrGlyGlyAlaSerGlyPheLeu-430
432-AspArgLeuGluGluAspGlyThrVal-440
443-PheValGluArgAsnAspGlyPheArgLeuProGluAspSerArgLysPro-459
464-GlySerGlyThrGly-468
478-GlnArgAlaAlaGluAsnAlaGluGlyLysAsn-488
509-GlnPheAlaLysAspGlyPheLeuHisArgTyrAspPheAlaTrpSerArgAspGlnGluGluLysIleTyr
Val-533
535-AspLysIleArgGluGlnAlaGlu-542
559-AspAlaAlaLysMetAlaLysAspValGlu-568
579-GlyHisLeuAspGluGluGlyAlaGluGluTyrLeuAspMetLeuArgGluGluLysArgTyrGlnArgAsp
ValTyr

Hydrophilic Regions - Hopp-Woods
1-MetSerGluHisAspMetGlnAsn-8
75-GlyAsnAlaLysSerValAlaAspLysAlaAlaAspSerLeuGlu-89
96-SerArgAlaGluLeuLysAspTyrLysAlaLysAsnIleAlaGlyGluArgArgLeu-114
120-ThrGlnGlyGluGlyGluProProLysGluAlaValVal-132
137-LeuAsnGlyLysLysAlaProLysLeuAspLys-147
166-AlaGlyLysAspPheAspArgArgPheGluGluLeuGlyAlaLysArgLeuLeuGluArgValAspAlaAsp
LeuAspPhe-192
207-LeuLysGluGluAlaAlaLysAsnArgAlaThrPro-218
230-ThrAlaProAspGlyArgTyrCysLys-238
251-LysIleThrAlaArgGlnSerAspLysAspValArgHisIleGluIleAspLeuSerGly-270
288-AspProAlaLeuVal-292
344-GluGluLeuAspLysIleIleAla-351
398-AlaGlnAlaGluValGlyAspGluValHis-407
415-PheGluHisGluGlyArgAlaArgThrGlyGly-425
432-AspArgLeuGluGluAspGlyThrVal-440
443-PheValGluArgAsnAspGlyPheArgLeuProGluAspSerArgLysPro-459
479-ArgAlaAlaGluAsnAlaGluGlyLys-487
523-TrpSerArgAspGlnGluGluLysIleTyrVal-533
535-AspLysIleArgGluGlnAlaGlu-542
559-AspAlaAlaLysMetAlaLysAspValGlu-568

580-HisLeuAspGluGluGlyAlaGluGluTyrLeuAspMetLeuArgGluGluLysArgTyrGlnArgAspVal
Tyr-604
151
AMPHI Regions - AMPHI
6-AsnIleAlaIleIleAla-11
22-AspGlnLeuLeuArg-26
72-ValAspThrProGlyHis-77
81-GlyGlyGluValGluArgValLeuGlyMetValAspCysVal-94
128-LysIleAspLysPro-132
144-PheGluLeuPheAspAsnLeuGlyAlaThr-153
165-SerGlyLeuSerGlyPheAlaLysLeuGluGluThrAspGluSerAsn-180
184-ProLeuPheAspThrIleLeuLysTyrThr-193
248-GlyArgIleAsnGlnLeuLeuGlyPheLysGlyLeuGluArgVal-262
273-ValIleIleSerGlyIleGlu-279
330-IleArgAspArgLeuGlnLysGluLeu-338
348-AspThrAlaAspAla-352
395-CysGluProTyrGluAsnLeuThrValAsp-405
457-LeuThrArgGlyValGly-462
464-MetSerHisValPheAsp-469
537-LysGlyLysLysLeuThrAsnIle-544
551-GluAlaValArgLeuThrThr-557

Antigenic Index - Jameson-Wolf
1-MetLysGlnIleArg-5
13-ValAspHisGlyLysThrThrLeu-20
24-LeuLeuArgGlnSerGlyThrPheArgAlaAsnGlnGlnValAspGluArgValMetAspSerAsnAspLeuG
luLysGluArgGlyIle-53
59-AsnThrAlaIleAspTyrGluGlyTyr-67
72-ValAspThrProGlyHisAlaAspPheGlyGlyGluValGluArg-86
99-AspAlaGlnGluGlyProMetProGlnThrArgPheValThr-112
128-LysIleAspLysProSerAlaArgProSerTrp-138
151-GlyAlaThrAspGluGlnLeuAsp-158
171-AlaLysLeuGluGluThrAspGluSerAsnAspMetArgProLeu-185
193-ThrProAlaProSerGlySerAlaAspGluThrLeu-204
211-LeuAspTyrAspAsnTyrThrGly-218
226-LeuAsnGlyArgIleLysProGlyGln-234
240-AsnHisAspGlnGlnIleAla-246
257-LysGlyLeuGluArgValProLeuGluGluAlaGluAlaGlyAsp-271
277-GlyIleGluAspIleGly-282

287-IleThrAspLysAspAsnProLysGlyLeuPro-297
300-SerValAspGluProThrLeu-306
314-ThrSerProLeuAlaGlyThrGluGlyLysPheValThrSerArgGlnIleArgAspArgLeuGlnLysGlu
LeuLeu-339
344-LeuArgValGluAspThrAlaAspAlaAspValPheArgValSerGlyArgGlyGluLeu-363
371-AsnMetArgArgGluGlyTyr-377
381-ValGlyLysProArgValValTyrArgAspIleAspGlyGlnLysCysGluProTyrGluAsnLeuThrVal
AspValProAspAspAsnGlnGlyAlaValMetGluGluLeuGlyArgArgArgGlyGluLeuThrAsnMetGluS
erAspGlyAsnGlyArgThrArgLeuGluTyr-440
467-ValPheAspAspTyrAlaProValLysProAspMetProGlyArgHisAsnGly-484
489-GlnGluGlnGlyGlu-493
501-AsnLeuGluAspArgGlyArgMetPheValSerProAsnAspLysIleTyr-517
524-IleHisSerArgAspAsnAspLeu-531
535-ProLeuLysGlyLysLysLeuThrAsnIleArgAlaSerGlyThrAspGluAlaValArg-554
569-PheIleAspAspAspGluLeuValGlu-577

579-ThrProGlnSerIleArgLeuArgLysArgTyrLeuSerGluLeuGluArgArgArgHisPheLysLysLeu
Asp-603

Hydrophilic Regions - Hopp-Woods
1-MetLysGlnIleArg-5
29-GlyThrPheArgAla-33
35-GlnGlnValAspGluArgValMetAspSerAsnAspLeuGluLysGluArgGlyIle-53
80-PheGlyGlyGluValGluArg-86
99-AspAlaGlnGluGlyProMetPro-106
128-LysIleAspLysProSerAla-134
151-GlyAlaThrAspGluGlnLeuAsp-158
171-AlaLysLeuGluGluThrAspGluSerAsnAspMetArgProLeu-185
198-GlySerAlaAspGluThrLeu-204
226-LeuAsnGlyArgIleLysPro-232
241-HisAspGlnGlnIleAla-246
258-GlyLeuGluArgValProLeuGluGluAlaGluAlaGlyAsp-271
277-GlyIleGluAspIleGly-282
287-IleThrAspLysAspAsnProLysGly-295
300-SerValAspGluProThrLeu-306
318-AlaGlyThrGluGlyLysPheValThr-326
328-ArgGlnIleArgAspArgLeuGlnLysGluLeuLeu-339
344-LeuArgValGluAspThrAlaAspAlaAspValPheArgValSerGlyArgGlyGluLeu-363
371-AsnMetArgArgGluGlyTyr-377
381-ValGlyLysProArgValValTyrArgAspIleAspGlyGlnLysCysGluProTyrGlu-400
405-AspValProAspAspAsnGlnGlyAlaValMetGluGluLeuGlyArgArgArgGlyGluLeuThrAsnMet
GluSerAspGlyAsnGlyArgThrArgLeu-438
472-AlaProValLysProAspMetProGlyArgHis-482
489-GlnGluGlnGlyGlu-493
502-LeuGluAspArgGlyArgMet-508
512-ProAsnAspLysIleTyr-517
525-HisSerArgAspAsnAspLeu-531
536-LeuLysGlyLysLysLeuThrAsn-543
545-ArgAlaSerGlyThrAspGluAlaValArg-554
569-PheIleAspAspAspGluLeuValGlu-577
583-IleArgLeuArgLysArgTyrLeuSerGluLeuGluArgArgArgHisPheLysLysLeuAsp-603
152
AMPHI Regions - AMPHI
10-LeuProThrArgLeuPhe-15
66-ArgPheSerArgPheValGlnGlyTrpAlaGlyIleArgGlyTyrLeuLysAsnGlyIleProGluHisIleG
lnProGlyHisAsnProLeu-96
103-AlaLeuLeuAlaAla-107
130-LeuAsnHisLeuValSerGluHisThrGlySerLeu-141
150-PheLysLeuLeuAlaValPheSerAlaIleHisIleAlaAlaValAlaAlaTyr-167

Antigenic Index - Jameson-Wolf
1-MetLysAsnLysThrLysVal-7
29-SerAlaLysAlaGlyGlyAsp-35
61-GlySerAspThrAlaArgPheSerArg-69
79-GlyTyrLeuLysAsnGlyIleProGluHisIleGlnProGlyHisAsnProLeu-96
118-AlaAlaAspGluAsnThrPheSerThrAsnGlyTyr-129
137-HisThrGlySerLeuMetArg-143
169-ValPheLysLysLysAsnLeu-175
186-IleGluGlyLysThrSerIle-192

Hydrophilic Regions - Hopp-Woods

1-MetLysAsnLysThrLysVal-7
63-AspThrAlaArgPhe-67
118-AlaAlaAspGluAsnThrPhe-124
169-ValPheLysLysLysAsnLeu-175
186-IleGluGlyLysThrSerIle-192
153
AMPHI Regions - AMPHI
17-AlaAlaSerValLeuSerLeuProGluMetMetArgLeuMetValPhe-32
96-ThrLeuValAlaTyrIleLysLeuSerSerValAlaGlu-108
130-ValSerValProGlnHisTrp-136
222-ValAsnThrIleLeuAsnGlyIleAlaTyr-231
274-AlaLysLysLeuSerHisLeuTyrArgIleThrGluAlaValGlyArgTrpSerMetIleAspIlePheVal
Ile-298

Antigenic Index - Jameson-Wolf
65-IleArgLysGlnAla-69
81-ValArgLeuArgGln-85
107-AlaGluValArgPhe-111
143-ArgLeuThrGlyAspAsnAlaValGlnThrAlaSerGluGlyLysThrCysCysSer-161
165-TyrPheArgAspSerAlaGluSerProCysGly-175
180-GluLeuTyrArgArgArgProLysSerLeuSer-190
215-SerAsnProAlaAlaThr-220
234-AspGluGlyAspArgLeu-239
272-ThrGlyAlaLysLysLeu-277
339-LeuLeuTrpAspLysArgAlaSerAspGlyIleAla-350
352-AsnGluThrGluLysHisAsp-358

Hydrophilic Regions - Hopp-Woods
81-ValArgLeuArgGln-85
107-AlaGluValArgPhe-111
152-ThrAlaSerGluGlyLysThrCysCys-160
168-AspSerAlaGluSerPro-173
180-GluLeuTyrArgArgArgProLysSerLeuSer-190
234-AspGluGlyAspArgLeu-239
273-GlyAlaLysLysLeu-277
339-LeuLeuTrpAspLysArgAlaSerAsp-347
352-AsnGluThrGluLysHisAsp
154
AMPHI Regions - AMPHI
122-GlyValThrGlyLeuGlyThrLeuLeu-130
152-GlnAspIleProProValThr-158
262-ThrLysAsnSerLysAsnValLysSer-270
298-PheLysGlnSerVal-302
"

"

360-SerLysGluHisTrpLysGlnGlnPheGlnThrAlaLeuAsnLysGlyLeuThrAla-378
389-SerLysMetIleGluLeuAsnAsp-396

"

429-LysLeuAlaAspLeuLeuAspLysPheAspLysLeuPro-441
446-ValAlaGluLeuAsnGly-451
467-LeuSerSerIleAspLysLeuValGlyLysProGlnThrGlnAsnIleProAsnGluLeuAsnGlnThrLeu
LysGluLeuArgThrThr-496

506-IleTyrGlyAspValGlnAsnThrLeuGlnSerLeuAspLysThrLeuLysAspValGlnProValIleAsn
ThrLeuLysGluLys-534

"

Antigenic Index - Jameson-Wolf

1-MetThrAspAsnSerProProProAsnGlyHisAlaGlnAlaArgValArgLysAsnAsnThr-21
43-LysGluIleArgAsnArgGlyProVal-51
57-AspSerAlaGluGlyIleGluValAsnAsnThr-67
75-AspValGlyArgValThrArgIleLysLeuArgAspAspGlnLysGlyValGlu-92
100-AspValSerGlyLeuIleArgSerAspThrGln-110
114-ValLysProArgIleAspGlnSerGly-122
138-ThrProGlyLysSerAspGluAlaLysAspValPheGln-150
"

"

169-LeuIleGlyLysAsnAspArgIleLeuAsn-178

"

196-AlaHisPheAspProSerAspGlnSer-204
212-GlnSerProAsnAspLysLeuIle-219

228-GluSerGlyIleAsnIleGluThrThrGlySerGlyIleLysLeuAsnSer-244
256-SerPheAspSerProLysThrLysAsnSerLysAsnValLysSerGluAspSer-273
"

"

275-ThrLeuTyrAspSerArgSerGluValAlaAsnLeuProAspAspArgSerLeu-292
300-GlnSerValArgGlyLeu-305
311-ValGluTyrLysGlyLeuAsn-317
325-ProTyrPheAspArgAsnAspSer-332
345-IleArgIleGluProSerArgLeuGluIleAsnAlaAspGluGlnSerLysGluHisTrpLysGlnGlnPhe
-368
"

"

371-AlaLeuAsnLysGlyLeu-376
386-LeuThrGlySerLysMetIleGluLeuAsnAspGlnProSerAlaSerProLysLeuArgPro-406
"

"

419-GlnGlyGlyGlyLeuAspAspLeuGlnValLysLeu-430
432-AspLeuLeuAspLysPheAspLysLeuProLeuAspLysThrValAla-447
450-AsnGlySerLeuAlaGluLeuLysSerThrLeuLysSerAlaAsn-464
469-SerIleAspLysLeuValGlyLysProGlnThrGlnAsnIleProAsnGluLeuAsnGlnThrLeuLysGlu
LeuArgThrThr-496
500-ValSerProGlnSer-504
516-SerLeuAspLysThrLeuLysAspValGln-525

"

530-ThrLeuLysGluLysProAsn-536

"

541-AsnSerSerSerLysAspProIleProLysGlySerArg-553
"

Hydrophilic Regions - Hopp-Woods

1-MetThrAspAsnSerProProPro-8
12-AlaGlnAlaArgValArgLysAsnAsn-20

"
43-LysGluIleArgAsnArgGly-49
57-AspSerAlaGluGlyIleGlu-63
75-AspValGlyArgValThrArgIleLysLeuArgAspAspGlnLysGlyValGlu-92
105-IleArgSerAspThr-109

"
116-ProArgIleAspGln-120
"

"
140-GlyLysSerAspGluAlaLysAspValPheGln-150
"

"
171-GlyLysAsnAspArgIleLeu-177
196-AlaHisPheAspProSerAspGln-203

"
214-ProAsnAspLysLeuIle-219
258-AspSerProLysThrLysAsnSerLysAsnValLysSerGluAspSer-273

"
278-AspSerArgSerGluVal-283
285-AsnLeuProAspAspArgSer-291
311-ValGluTyrLysGly-315
328-AspArgAsnAspSer-332

"
345-IleArgIleGluProSerArgLeuGluIleAsnAlaAspGluGlnSerLysGluHisTrpLys-365
390-LysMetIleGluLeuAsnAspGlnProSerAlaSerProLysLeuArgPro-406

"
421-GlyGlyLeuAspAspLeuGlnValLysLeu-430
"

"
432-AspLeuLeuAspLysPheAspLysLeuProLeuAspLysThrValAla-447

"
454-AlaGluLeuLysSerThrLeuLysSerAlaAsn-464

"
469-SerIleAspLysLeuValGly-475
"

"
482-IleProAsnGluLeu-486

498-GlnThrLeuLysGluLeuArgThr-495

"

516-SerLeuAspLysThrLeuLysAspValGln-525

"

530-ThrLeuLysGluLysProAsn-536

"

543-SerSerLysAspProIleProLysGlySerArg-553

155
AMPHI Regions - AMPHI
28-LysLeuGlyPheGlu-32
42-AlaAlaSerLeuAsp-46
105-LeuArgAlaLysLysVal-110

118-ValProArgIleSerArgAlaGlnAlaLeuAspAlaLeuSerSerMetAlaAsnIleSerGlyTyrArgAla
ValIleGluAlaAlaAsnAlaPheGlyArgPhePheThrGly-155
175-ValAlaGlyLeuAlaAlaIleGlyThrAlaAsnSerLeuGlyAlaValValArgAlaPhe-194
201-AlaGluGlnIleGluSerMetGlyGly-209
225-AspGlyTyrAlaLysValMet-231
262-LysProAlaProLysLeuIleThrLysGluMetValGluSerMetLys-277
295-LeuThrArgProGlyGlu-300
308-ValLysIleIleGlyTyrThrAspMetAlaAsnArgLeuAlaGlyGln-323
330-ThrAsnLeuValAsnLeuThrLysLeuLeuSer-340
404-LysLeuAlaProAlaVal-409
428-AsnHisPheIleVal-432
451-LeuHisThrProLeuMetSerValThrAsnAlaIleSerGlyIleIle-466
469-GlyAlaLeuLeuGln-473
478-AsnGlyPheValSerLeuLeuSerPheValAla-488
494-IleAsnIlePheGlyGly-499

Antigenic Index - Jameson-Wolf
4-GlyIleProArgGluSerLeuSerGlyGluThrArgVal-16
44-SerLeuAspAspAlaAla-49
72-ValAsnAlaProSerGluGlnGluLeu-80
94-TrpProArgGlnAsnGluAlaLeu-101
105-LeuArgAlaLysLysValAsn-111
117-MetValProArgIleSerArg-123
159-AlaAlaGlyLysValProProAla-166
194-PheAspThrArgLeuGluValAlaGluGlnIleGluSerMetGlyGlyLys-210
215-AspPheProGlnGluSerGlyGlySerGlyAspGlyTyrAlaLysValMetSer-232
242-LeuPheAlaGluGlnAlaLysGluValAsp-251
259-IleProGlyLysProAlaProLysLeuIleThr-269
271-GluMetValGluSerMetLysSerGlySer-280
289-ThrGlyGlyAsnCysGluLeuThrArgProGlyGluLeuSerVal-303
320-LeuAlaGlyGlnSerSer-325
338-LeuLeuSerProAsnLysAspGlyGluIle-347
349-LeuAspPheGluAspValIle-355
361-ValThrHisAspGlyGluIleThrPhePro-370
378-AlaGlnProGlnGlnThrProSerGluLysAlaValProAlaAlaLysProGluProLysPro-398

Hydrophilic Regions - Hopp-Woods
4-GlyIleProArgGluSerLeuSerGlyGluThrArgVal-16

44-SerLeuAspAspAlaAla-49
74-AlaProSerGluGlnGluLeu-80
96-ArgGlnAsnGluAlaLeu-101
105-LeuArgAlaLysLysValAsn-111
117-MetValProArgIleSerArg-123
194-PheAspThrArgLeuGluValAlaGluGlnIleGluSerMetGly-208
215-AspPheProGlnGluSerGlyGlySerGlyAspGlyTyrAla-228
242-LeuPheAlaGluGlnAlaLysGluValAsp-251
260-ProGlyLysProAlaPro-265
271-GluMetValGluSerMetLysSer-278
291-GlyAsnCysGluLeuThrArgProGlyGlu-300
340-SerProAsnLysAspGlyGluIle-347
349-LeuAspPheGluAspValIle-355
363-HisAspGlyGluIle-367
382-GlnThrProSerGluLysAlaValProAlaAlaLysProGluProLysPro-398
156
AMPHI Regions - AMPHI
56-AsnGlyPheGluAlaPheAlaProPhe-64

Antigenic Index - Jameson-Wolf
21-TyrAlaLysLysAlaGlyGlyPheArgPheLysAspAsnHisAsnProArgGly-38
44-GlnGlyAlaAlaAla-48
51-HisAlaAlaGlnGlnAsnGlyPheGlu-59
73-AlaThrGlyAsnAlaAla-78
103-AspLysAlaAlaMet-107

Hydrophilic Regions - Hopp-Woods
21-TyrAlaLysLysAlaGlyGlyPheArgPheLysAspAsnHisAsnPro-36
103-AspLysAlaAlaMet-107
157
AMPHI Regions - AMPHI
21-GlyArgAspValArgAlaAla-27
32-IleAsnHisLeuLeuLysArg-38
61-PheValArgAlaAlaGln-66
167-GlnLeuValAspArg-171
176-AlaHisAspArgSerLeuAspGlyPhe-184

Antigenic Index - Jameson-Wolf
1-MetArgAsnGluGluLysArgAlaLeuArgArgGluLeuArgGlyArgArgSerGlnMetGlyArgAspValAr
gAla-26
38-ArgTyrIleLysLysGlyArgLysIle-46
51-ProMetGlyLysGluLeuArgLeuAspGlyPheVal-62
64-AlaAlaGlnLysArgGlyAla-70
77-IleGluProArgSerArgArgMetTrp-85
89-TyrProAlaAspGlyValLysGlnGluArgLysArgGlyArgAlaLysLeuHis-106
111-AlaGlyArgLysLysArgValHisAsp-119
129-GlyMetAspArgLeuGlyTyr-135
151-MetLysTyrArgLeuGlnAla-157
172-LeuProValGluAlaHisAspArgSerLeuAspGlyPheVal-185

Hydrophilic Regions - Hopp-Woods
1-MetArgAsnGluGluLysArgAlaLeuArgArgGluLeuArgGlyArgArgSerGlnMetGlyArgAspValAr
gAla-26
38-ArgTyrIleLysLysGlyArgLysIle-46
54-LysGluLeuArgLeu-58

64-AlaAlaGlnLysArgGlyAla-70
77-IleGluProArgSerArgArg-83
92-AspGlyValLysGlnGluArgLysArgGlyArgAlaLysLeu-105
111-AlaGlyArgLysLysArgValHisAsp-119
131-AspArgLeuGlyTyr-135
151-MetLysTyrArgLeuGlnAla-157
172-LeuProValGluAlaHisAspArgSerLeuAsp-182
158
AMPHI Regions - AMPHI
20-PheSerArgAlaAlaGluGlnLeu-27
33-AlaValSerArgIleValLysArgLeuGlu-42
46-GlyValAsnLeuLeuAsnArgThr-53
63-GlyAlaGlnTyrPheArgArgAlaGlnArgIleLeuGlnGlu-76
85-LeuAlaValHisGluIleProGln-92
166-ValIleAlaSerPro-170
178-ThrProGlnSerThrGluGluLeu-185
188-HisGlnCysLeuGlyPheThrGluProGlySerLeuAsnThrTrpAlaVal-204

Antigenic Index - Jameson-Wolf
1-MetLysThrAsnSerGluGluLeu-8
16-GluSerGlySerPheSerArgAlaAlaGlu-25
36-ArgIleValLysArgLeuGluGluLysLeuGly-46
49-LeuLeuAsnArgThrThrArgGlnLeuSerLeuThrGluGluGlyAlaGlnTyrPheArgArgAlaGlnArgI
leLeuGln-75
78-AlaAlaAlaGluThrGluMet-84
114-LysPheAsnGluArgTyrProHisIleArg-123
136-IleGluArgLysValAspIle-142
144-LeuArgAlaGlyGluLeuAspAspSerGlyLeuArgAla-156
158-HisLeuPheAspSerArgPheArgVal-166
168-AlaSerProGluTyrLeuAlaLysHisGlyThrProGlnSerThrGluGluLeuAla-186
192-GlyPheThrGluProGlySerLeuAsn-200
207-AlaGlnGlyAsnProTyrLysIle-214
216-ProHisPheThrAlaSerSerGlyGluIleLeu-226
229-LeuCysLeuSerGlyCys-234
243-LeuValAspAsnAspIleAlaGluGlyLysLeu-253
259-GluGlnThrSerAspLysThrHisProPhe-268
273-TyrSerAspLysAlaValAsnLeu-280
292-GluLeuGlyAsnAsnLeuCysGly-299

Hydrophilic Regions - Hopp-Woods
1-MetLysThrAsnSerGluGluLeu-8
19-SerPheSerArgAlaAlaGlu-25
36-ArgIleValLysArgLeuGluGluLysLeuGly-46
58-SerLeuThrGluGluGlyAlaGlnTyrPheArgArgAlaGlnArgIleLeuGln-75
78-AlaAlaAlaGluThrGluMet-84
114-LysPheAsnGluArgTyrPro-120
136-IleGluArgLysValAspIle-142
144-LeuArgAlaGlyGluLeuAspAspSerGlyLeuArgAla-156
162-SerArgPheArgVal-166
180-GlnSerThrGluGluLeuAla-186
246-AsnAspIleAlaGluGlyLysLeu-253
260-GlnThrSerAspLysThrHis-266
276-LysAlaValAsnLeu-280
160
AMPHI Regions - AMPHI

6-LysLeuValAspPheAlaGlnLeuThrGly-15
72-GlyLeuGlyHisVal-76
121-AlaAspLeuMetAsnGlyLeuProGluThr-130
157-GlyThrValSerMetValAsnAlaLeuSerSer-167
186-LeuSerGlyValLeuLysGlyTrpGlnAspLysArg-197
200-HisLeuIleGlnLysValIleAspLysProGlu-210
218-MetValAlaAlaAlaAsn-223
229-LeuMetArgArgPhe-233
242-HisAlaPheValAsnHisIleArg-249
279-PheGlyLysAlaPheLys-284

Antigenic Index - Jameson-Wolf
2-AspIleLeuAspLysLeuVal-8
28-SerValArgHisGluThrLeuGlnArgGluGlyLeu-39
51-CysIleAspGlyGluThrSerProArgProValSerThrGlyAsp-65
77-LeuSerHisAspGlyLysCysGlyGluSerLeuGlnProAspMetArgGlnHisGly-95
101-GlnCysGlyAsnGlyGlnAspMet-108
115-PheArgTyrAspThrHisAla-121
123-LeuMetAsnGlyLeu-127
149-LeuGluSerLysLysProLeu-155
178-LeuGluGlnAspLysAspValGluLeu-186
192-GlyTrpGlnAspLysArgLeuGly-199
205-ValIleAspLysProGluAspGluTrpAsnValAspLysMetVal-219
228-GlnLeuMetArgArgPheLysSerArgValGlyLeuSerProHis-242
255-LeuLeuLeuLysLysAsnProAspSerVal-264
274-GlnSerGluThrHisPhe-279
281-LysAlaPheLysArg-285
290-SerProGlyGlnTyrArgLysGluGlyGlyGlnLys-301

Hydrophilic Regions - Hopp-Woods
2-AspIleLeuAspLysLeuVal-8
29-ValArgHisGluThrLeuGlnArgGluGlyLeu-39
53-AspGlyGluThrSerProArgProValSer-62
79-HisAspGlyLysCysGlyGluSerLeuGlnProAspMetArgGln-93
101-GlnCysGlyAsnGlyGlnAsp-107
149-LeuGluSerLysLysProLeu-155
178-LeuGluGlnAspLysAspValGluLeu-186
193-TrpGlnAspLysArgLeuGly-199
205-ValIleAspLysProGluAspGluTrpAsnVal-215
228-GlnLeuMetArgArgPheLysSerArgValGly-238
255-LeuLeuLeuLysLysAsnProAspSer-263
281-LysAlaPheLysArg-285
293-GlnTyrArgLysGluGlyGlyGlnLys-301
163
AMPHI Regions - AMPHI
60-SerSerLeuGlyAsnIle-65
67-LeuGlyArgAspGluAsp-72
76-PheGlyPheLeuSerTrpLeuAlaMetLeuPhe-86
100-AlaGluProLeuMetHisTyrPheSerAspIleThrAla-112
170-IleSerGlyArgPheGlyAspAlaIleAspIleMetAlaLeuLeuAlaThrPhePheGlyIleIleThrThr
-193
227-MetSerLeuAlaValValSerAlaIleSerGlyValGlyLysGlyValLysValLeuSer-246
272-AlaPheGlyAspAsnIleGlyAsnTyrLeuGlyAsnLeuValArg-286
313-TrpCysSerTrpAlaProPheValGlyLeuPheIleAla-325
346-LeuPheGlyValLeuTrpPhe-352

367-AlaGlyGlyMetLeuGluLysMetThrSerSer-377
380-ThrLeuLeuPheLysPhePheAsnTyrLeuProLeuProGluLeuThrSerIleValSerLeuLeu-401
438-TrpGlyValLeuMetSerAla-444
454-GlyLeuGlyAsnLeuGlnSerMetThrLeu-463
520-GluGlnAspIleLeuLysPheLeuLysGlnThrAlaSerPro-533
535-MetHisGluLeuGlnArgGluLeu-542
574-AspPheMetTyrGlyIle-579
583-GlyGlnAspValSerAspGlnLeu-590
630-AlaAspIleLeuLysAsnTyr-636

Antigenic Index - Jameson-Wolf
29-AspArgAlaLysGlu-33
65-IleArgLeuGlyArgAspGluAspValPro-74
111-ThrAlaGlyThrProGluHisArgGlnGln-120
166-LeuLysGluLysIleSerGlyArgPheGlyAspAlaIleAsp-179
200-GlnLeuGlyAlaGlyLeu-205
237-GlyValGlyLysGlyValLysVal-244
293-AlaTyrGluArgGluHisLysProTrpPhe-302
326-ArgIleSerLysGlyArgThrIleArg-334
370-MetLeuGluLysMetThrSerSerProGlu-379
409-ThrSerAlaAspSerGlyIle-415
421-IleThrSerArgAspLysGlyLeuSerAlaProArgTrp-433
451-ArgSerGlyGlyLeuGlyAsn-457
484-LeuSerAlaAspLysLysTyrPheGluThrArgValAsnProThrSer-499
503-ThrGlyGlyLysTrpLysGluArgLeu-511
516-SerGlnThrGlnGluGlnAspIle-523
527-LeuLysGlnThrAlaSer-532
537-GluLeuGlnArgGluLeuSerGluGluTyrGlyLeu-548
550-ValArgValAspLysMetPheHisArgAspGluProAla-562
566-ValIleArgLysGluThrMetArg-573
581-SerValGlyGlnAspValSerAspGlnLeuIleAsnAspGlyLysLeuProHisIleArgHisGlnThrThr
TyrLysProTyr-608
612-PheAspGlyArgValGlyTyr-618
622-TyrMetAsnLysAspGluLeuIle-629
632-IleLeuLysAsnTyrGlu-637
654-GluGlnValGluLeuAlaGlu-660

Hydrophilic Regions - Hopp-Woods
29-AspArgAlaLysGlu-33
66-ArgLeuGlyArgAspGluAspValPro-74
114-ThrProGluHisArgGlnGln-120
166-LeuLysGluLysIleSerGlyArgPheGlyAsp-176
238-ValGlyLysGlyValLysVal-244
293-AlaTyrGluArgGluHisLysPro-300
327-IleSerLysGlyArgThrIleArg-334
370-MetLeuGluLysMetThrSerSerPro-378
422-ThrSerArgAspLysGlyLeuSer-429
484-LeuSerAlaAspLysLysTyrPheGlu-492
506-LysTrpLysGluArgLeu-511
517-GlnThrGlnGluGlnAspIle-523
537-GluLeuGlnArgGluLeuSerGluGluTyrGlyLeu-548
550-ValArgValAspLysMetPheHisArgAspGluProAla-562
566-ValIleArgLysGluThrMetArg-573
581-SerValGlyGlnAspValSerAsp-588
590-LeuIleAsnAspGlyLysLeuProHis-598

622-TyrMetAsnLysAspGluLeuIle-629
654-GluGlnValGluLeuAlaGlu-660
164
AMPHI Regions - AMPHI
6-AlaAsnPheTyrGluMetLeuAlaAlaAla-15
33-AlaTyrArgAlaLeuLysGlnGlu-40
75-AlaIleSerAlaIleGlyAlaVal-82
97-TyrIleLeuAsnAspCys-102
113-LeuSerLysGluLeuAlaGlyLeuLysAla-122
148-PheGluAspValArgArgPheProGlu-156
160-LeuGlyArgGlnProArgIleAsnAspLeuAlaHis-171
189-TyrAlaAsnLeuPheAlaAsnLeuAsnGlyIleGluArgIlePheLys-204
264-ValProAlaIleTyrThr-269
282-TrpPheAsnArgIle-286
311-AlaLysLeuLeuGluGlyTyrGlyLeuSer-320
362-GluValGlyGluLeuIle-367
374-MetArgGlyTyrLeuAsn-379
387-ThrIleValAsnGlyTrpLeuLys-394
424-ValTyrProArgGluIleGluGluGlu-432
459-PheValGlnLeuLysGluGlyMet-466
472-GluIleArgArgHisLeuArgThrVal-480
484-PheLysIleProLysGln-489
499-AsnAlaThrGlyLysValLeuLysArgValLeuLysGluGlnPheAspGlyAsn-516

Antigenic Index - Jameson-Wolf
1-MetAsnArgThrTyr-5
15-AlaCysArgLysAsnGlyAsnGly-22
26-PheAspGlyLysGluLysThrAlaTyrArgAlaLeuLysGlnGluAlaGluAla-43
63-ValSerAsnSerThrGlu-68
88-ThrPheLeuLysAsnSerGlu-94
100-AsnAspCysLysAla-104
112-GlyLeuSerLysGluLeuAlaGly-119
121-LysAlaGlnThrProValGlu-127
130-IleTrpThrAspLysSerArgProThrGlyGluThrAlaGluGlyAspAlaPhePheGluAspValArgArg
PheProGluLysProAspLeuGlyArgGlnProArgIleAsnAsp-168
175-SerGlyThrThrGlyHisProLysGlyAla-185
196-LeuAsnGlyIleGluArgIlePheLysIleSerLysArgAspArgPhe-211
253-ThrLeuLeuLysArg-257
290-IleSerGlyGlyAlaProLeuAla-297
304-PheLysAlaLysPheProArg-310
317-TyrGlyLeuSerGluAlaSer-323
330-ThrProGluArgGlnLysAlaArgSer-338
343-LeuProGlyLeuGluAlaLysAlaValAspGluGluLeuValGluValProArgGlyGluValGly-364
367-IleValArgGlyGlySerValMet-374
382-AlaAlaThrAspGluThrIle-388
393-LeuLysThrGlyAsp-397
400-ThrIleAspGluAspGly-405
410-ValAspArgLysLysAspLeuIleIleSerLysGlyGlnAsnValTyrProArgGluIleGluGluGluIle
TyrLys-435
446-GlyValLysAspArgTyrAlaAspGluGluIle-456
462-LeuLysGluGlyMetAspLeuGlyGluAsnGluIleArgArgHisLeuArg-478
490-IleHisPheLysAspGlyLeuProArgAsnAlaThrGlyLysValLeuLysArgValLeuLysGluGlnPhe
AspGlyAsnLys-517

Hydrophilic Regions - Hopp-Woods

15-AlaCysArgLysAsnGlyAsn-21
26-PheAspGlyLysGluLysThrAlaTyrArgAlaLeuLysGlnGluAlaGluAla-43
112-GlyLeuSerLysGluLeuAlaGly-119
133-AspLysSerArgProThrGlyGluThrAlaGluGlyAspAlaPhePheGluAspValArgArgPheProGlu
LysProAspLeuGlyArgGlnProArgIleAsnAsp-168
198-GlyIleGluArgIlePheLysIleSerLysArgAspArgPhe-211
253-ThrLeuLeuLysArg-257
304-PheLysAlaLysPheProArg-310
330-ThrProGluArgGlnLysAlaArgSer-338
346-LeuGluAlaLysAlaValAspGluGluLeuValGluValProArgGlyGluValGly-364
382-AlaAlaThrAspGluThrIle-388
400-ThrIleAspGluAspGly-405
410-ValAspArgLysLysAspLeuIleIle-418
425-TyrProArgGluIleGluGluGluIleTyrLys-435
446-GlyValLysAspArgTyrAlaAspGluGluIle-456
462-LeuLysGluGlyMetAspLeuGlyGluAsnGluIleArgArgHisLeuArg-478
494-AspGlyLeuProArgAsnAlaThr-501
503-LysValLeuLysArgValLeuLysGluGlnPheAspGlyAsnLys-517
165-1
AMPHI Regions - AMPHI
17-AlaThrLeuGlyValLeuLeuLysGluLeu-26
33-ThrLeuIleGluArgLeuGluAsp-40
72-IleIleAspProAlaArgAlaLeuAsnIleAla-82
90-GlnPheTrpAlaThr-94
108-AsnAlaValProHis-112
125-LeuGlnLysArgTyrAspAlaPheLysThrGlnLysLeuPheGluAsnMet-141
182-ArgLeuThrArgGlnMetValLysTyrLeuGlnGly-193
198-ThrGluPheAsnArgHisValGluAspIleLysArgGlu-210
348-GlyTrpAlaAsnMetPro-353
364-LysThrLysGluGlu-368
371-AlaSerLeuLeuGluTyrTyr-377
453-TrpGluAspArgLeuLysGluLeu-460

Antigenic Index - Jameson-Wolf
1-MetAlaGluAlaThrAsp-6
24-LysGluLeuGluProSerTrp-30
36-GluArgLeuGluAspValAlaLeuGluSerSerAsnAlaTrpAsnAsnAlaGlyThrGly-55
97-AlaGluGlyLysLeuGluAspAsnSer-105
117-MetAsnGluAspHisCysSerTyrLeuGlnLysArgTyrAspAlaPheLysThrGlnLysLeuPheGlu-13
9
141-MetGluPheSerThrAspArgAsnLysIleSerAsp-152
157-MetMetArgGlyArgAspGluAsnGlnPro-166
169-AlaAsnTyrSerAlaGluGlyThrAspValAspPheGlyArgLeuThrArgGlnMet-187
191-LeuGlnGlyLysGlyValLysThrGluPheAsnArgHisValGluAspIleLysArgGluSerAspGly-21
3
319-ThrAlaAspThrArgAsnProAspGlyGlnLeu-229
249-GlnLysSerGlyIleProGluGlyLysGlyTyrGly-260
269-PheArgAsnSerAsnProGluThrAlaGluGlnHisAsn-281
300-LeuAspThrArgAsnValAspGlyLysArgHisLeu-311
322-AsnPheLeuLysGlnGlySerLeuMet-330
361-GluLeuArgLysThrLysGluGluArgPhe-370
377-TyrProGluAlaAsnProAspAspTrpGlu-386
395-GlnIleIleLysLysAspSerGluLysGlyGly-405
415-AlaHisAlaAspGlySer-420
428-SerProGlyAlaSerThr-433

446-PheProGluArgAlaProSerTrpGluAspArgLeuLysGluLeuValProGlyTyr-464
467-LysLeuAsnGluAsnProGluArgAlaAspGlu-477

Hydrophilic Regions - Hopp-Woods
1-MetAlaGluAlaThrAsp-6
24-LysGluLeuGluPro-28
36-GluArgLeuGluAspValAlaLeuGluSer-45
97-AlaGluGlyLysLeuGluAspAsnSer-105
117-MetAsnGluAspHisCys-122
125-LeuGlnLysArgTyrAspAlaPheLysThr-134
141-MetGluPheSerThrAspArgAsnLysIleSerAsp-152
158-MetArgGlyArgAspGluAsnGlnPro-166
172-SerAlaGluGlyThrAspValAspPhe-180
182-ArgLeuThrArgGlnMet-187
194-LysGlyValLysThrGluPheAsnArgHisValGluAspIleLysArgGluSerAspGly-213
219-ThrAlaAspThrArgAsnProAspGly-227
252-GlyIleProGluGlyLysGly-258
272-SerAsnProGluThrAlaGluGlnHisAsn-281
300-LeuAspThrArgAsnValAspGlyLysArg-309
361-GluLeuArgLysThrLysGluGluArgPhe-370
380-AlaAsnProAspAspTrpGlu-386
395-GlnIleIleLysLysAspSerGluLysGlyGly-405
446-PheProGluArgAlaProSerTrpGluAspArgLeuLysGluLeuVal-461
467-LysLeuAsnGluAsnProGluArgAlaAspGlu-477

Hydrophilic Regions - Hopp-Woods
1-MetAlaGluAlaThrAsp-6
24-LysGluLeuGluPro-28
36-GluArgLeuGluAspValAlaLeuGluSer-45
97-AlaGluGlyLysLeuGluAspAsnSer-105
117-MetAsnGluAspHisCys-122
125-LeuGlnLysArgTyrAspAlaPheLysThr-134
141-MetGluPheSerThrAspArgAsnLysIleSerAsp-152
158-MetArgGlyArgAspGluAsnGlnPro-166
172-SerAlaGluGlyThrAspValAspPhe-180
182-ArgLeuThrArgGlnMet-187
194-LysGlyValLysThrGluPheAsnArgHisValGluAspIleLysArgGluSerAspGly-213
219-ThrAlaAspThrArgAsnProAspGly-227
252-GlyIleProGluGlyLysGly-258
272-SerAsnProGluThrAlaGluGlnHisAsn-281
300-LeuAspThrArgAsnValAspGlyLysArg-309
361-GluLeuArgLysThrLysGluGluArgPhe-370
380-AlaAsnProAspAspTrpGlu-386
395-GlnIleIleLysLysAspSerGluLysGlyGly-405
446-PheProGluArgAlaProSerTrpGluAspArgLeuLysGluLeuVal-461
467-LysLeuAsnGluAsnProGluArgAlaAspGlu-477

204-2
AMPHI Regions - AMPHI
43-GlnAlaPheAsnArgIleThrAspLeuPhePhe-53
62-AlaLeuSerGlnIle-66
70-AsnArgArgIleValAspIlePheAspPheGluAsn-81
83-PheArgArgAlaLeuTyrArgValLeuArgLeuPheArgArgIlePheGly-99

Antigenic Index - Jameson-Wolf

34-AspGlnSerAspAsnIleLeu-40
44-AlaPheAsnArgIle-48
66-IleGlnThrGlyAsnArgArgIleValAsp-75
77-PheAspPheGluAsnArgPheArgArgAlaLeu-87
101-AlaAlaGlyGlyLysGlnGlnAla-108
112-TyrGlyLysArgCysPhe-117
126-SerLysCysArgLeuLysArgGlyArgArgArgPheGlyArgHisArgValHisPheAsnGlyArgMetPro
ThrAlaSerArgThrLeuSerAsnAsnSerArgAlaSerLeu-163
169-ProAlaCysLysIle-173
177-CysGluGlySerAla-181

Hydrophilic Regions - Hopp-Woods
68-ThrGlyAsnArgArgIleValAsp-75
77-PheAspPheGluAsnArgPheArgArgAlaLeu-87
104-GlyLysGlnGlnAla-108
112-TyrGlyLysArgCysPhe-117
126-SerLysCysArgLeuLysArgGlyArgArgArgPheGlyArgHisArgVal-142
148-MetProThrAlaSerArgThrLeuSerAsnAsnSerArgAlaSerLeu-163
205-1 (same as orf108, so delete this one)
AMPHI Regions - AMPHI
21-SerGluAsnThrAlaGluGlnProGlnAsnAlaValGlnSerAlaProLys-37
79-GluGlnAsnValIleArgLeuIleGlyLysHisProGlyAspLeu-93
119-HisThrLeuPheAlaLysLeuValGlyAsnIleAlaGluAspGlyGlyLys-135

Antigenic Index - Jameson-Wolf
18-CysGlyLysSerGluAsnThrAlaGluGlnProGlnAsnAlaValGlnSerAlaProLysProValPhe-40
55-LeuGlyGlnSerSerGluGlyLysThrAsnAspGlyLysLysGlnIle-70
73-ProIleLysGlyLeuProGluGlnAsnVal-82
86-IleGlyLysHisProGlyAspLeuGluAlaValSerGlyLysCysMetGluThrAspAspLysAspSerProA
laGlyTrpAlaGlu-114
129-IleAlaGluAspGlyGlyLysLeuThr-137
149-TyrGlnAlaGlyLysSerGlyTyr-156
168-IleAspSerGluGly-172
175-TyrPheArgArgArgHisTyr-181

Hydrophilic Regions - Hopp-Woods
19-GlyLysSerGluAsnThrAlaGluGlnProGln-29
56-GlyGlnSerSerGluGlyLysThrAsnAspGlyLysLysGlnIle-70
89-HisProGlyAspLeuGluAlaValSer-97
99-LysCysMetGluThrAspAspLysAspSerPro-109
129-IleAlaGluAspGlyGlyLysLeu-136
150-GlnAlaGlyLysSerGly-155
168-IleAspSerGluGly-172
176-PheArgArgArgHisTyr-181
206-2
AMPHI Regions - AMPHI
32-ProLysGlnThrValArgGlnIleGlnAlaVal-42
44-IleSerHisIleAspArgThrGlnGly-52
81-CysSerGlyMetIleGln-86
99-ArgThrAlaArgAspMet-104
150-SerGlyLysThrIleLysThrGlu-157

Antigenic Index - Jameson-Wolf
2-PheProProAspLysThrLeu-8
21-GlyThrThrSerGlyLysHisArgGlnProLysProLysGlnThrValArg-37

45-SerHisIleAspArgThrGlnGlySerGln-54
66-ThrProTyrLysTrpGlyGlySerSerThr-75
96-LysLeuProArgThrAlaArgAspMetAlaAlaAlaSerArgLysIleProAspSerArgLeuLysAlaGly-
119
126-ThrGlyGlyAlaHisArgTyrSer-133
148-ProSerSerGlyLysThrIleLysThrGluLysLeuSer-160

Hydrophilic Regions - Hopp-Woods
23-ThrSerGlyLysHisArgGlnProLysProLysGlnThrVal-36
45-SerHisIleAspArgThrGlnGlySerGln-54
96-LysLeuProArgThrAlaArgAspMetAlaAlaAlaSerArgLysIleProAspSerArgLeuLysAlaGly-
119
149-SerSerGlyLysThrIleLysThrGluLysLeuSer-160
211-2
AMPHI Regions - AMPHI
18-ValGlyAsnGlyValAspGluPheGlyArgGlyAla-29
57-GlnPheGluArgAla-61
98-IleGluGlyPheAspLysIleAsnProAla-107

Antigenic Index - Jameson-Wolf
8-AsnGlnLeuGlyGlyArgAsnGlyThrAlaValGlyAsnGlyValAspGluPheGlyArgGlyAlaAspAsnGl
nValGluPheLeuGlu-37
44-GlyAlaSerGlyArgAlaAla-50
73-GlyGluAspAspValVal-78
100-GlyPheAspLysIleAsnProAlaVal-108

Hydrophilic Regions - Hopp-Woods
10-LeuGlyGlyArgAsnGlyThr-16
21-GlyValAspGluPheGlyArgGlyAlaAspAsnGlnValGluPheLeuGlu-37
73-GlyGluAspAspValVal-78
100-GlyPheAspLysIleAsn-105
212-2

AMPHI Regions - AMPHI
6-TrpAspGlyIleProAspIleArgThr-14
40-PheGlnThrAlaGlnAsp-45
64-LeuGlnPheAspSerIleAsnLeuIleGluHisIle-75
91-HisLeuHisGluHis-95
199-ArgLeuLeuGlyHis-203
238-HisAsnHisLeuTyrArgSerIleThrSerAlaGluAlaGluLysIle-253
397-TrpAsnGluAlaGluGluAla-403
439-AspSerProAspHis-443
445-ProLeuValGlyAlaLeuGlyAspIleAlaAlaMet-456
487-HisGlyThrArgGlyLeu-492
501-AlaIleAlaAlaGlnIleLeuGlyLeuPro-510

Antigenic Index - Jameson-Wolf
8-GlyIleProAspIleArgThrLeuAspGlnAlaIleArgLysHisAlaProProLeuAsn-27
33-ProAspAsnGlnIleProAspPheGlnThrAlaGlnAspAlaSerAspAlaGluCysArgLeuLysHisArgL
euAspGln-59
85-ProProSerArgThr-89
105-AlaIleProGlnThrGluSerLysProAspLysProTrp-117
120-LeuProGlnThrSerGluArgGlnLysProGluHis-131
158-LeuGluAlaArgLysAlaAlaGln-165
168-SerGlyAsnArgGlnGly-173

178-LysIleSerProHisAspThrGluGlnThrGlu-188
193-GlyTyrGlyTyrThrLys-198
205-LeuProGluSerGluThrTrpGlyGlyAsnGly-215
220-AsnTyrSerArgThrGluGlnGlnArgAsnHisGluLeuGlyLeu-234
246-ThrSerAlaGluAlaGluLysIleAla-254
260-ValProTyrAspHisProSerCys-267
294-LeuHisGluAspThrProLeu-300
302-AspIleSerHisAspGlyGluLysTrpIle-311
328-ThrGlyAlaAsnSerProTyrLeuPro-336
346-ArgGlnIleArgGlyGlnThrGlyLeuThrProSerThrProPheSerGluGlnLeuArg-365
376-ProSerTrpHisGly-380
391-AsnSerSerHisThrGlyTrpAsnGluAlaGluGluAlaSerAsnArgGlnAla-408
424-AsnProAsnProGlnLysHisGlnGly-432
436-IleArgCysAspSerProAspHisLeuPro-445
464-AlaLeuAspLysAsnTyrArgIleAspThrProCys-475
487-HisGlyThrArgGlyLeuAla-493
511-HisProPheSerGlnArgLeuArgHisAlaLeuHisProAsnArgThrIle-527
531-IleValArgArgLysAspLeuThrPro-539

Hydrophilic Regions - Hopp-Woods
10-ProAspIleArgThrLeuAspGlnAlaIleArgLysHisAlaPro-24
44-GlnAspAlaSerAspAlaGluCysArgLeuLysHisArgLeuAspGln-59
105-AlaIleProGlnThrGluSerLysProAspLys-115
122-GlnThrSerGluArgGlnLysProGluHis-131
158-LeuGluAlaArgLysAlaAlaGln-165
180-SerProHisAspThrGluGlnThrGlu-188
206-ProGluSerGluThr-210
222-SerArgThrGluGlnGlnArgAsnHisGlu-231
246-ThrSerAlaGluAlaGluLysIleAla-254
294-LeuHisGluAspThrProLeu-300
303-IleSerHisAspGlyGluLysTrpIle-311
346-ArgGlnIleArgGly-350
398-AsnGluAlaGluGluAlaSerAsnArgGlnAla-408
426-AsnProGlnLysHisGlnGly-432
436-IleArgCysAspSerProAsp-442
467-LysAsnTyrArgIleAspThr-473
515-GlnArgLeuArgHis-519
531-IleValArgArgLysAspLeuThrPro-539
214-1
AMPHI Regions - AMPHI
6-CysLysLeuPheValLeuIle-12
69-ValThrArgGlyGlyLysGlyGlyGluSerVal-79
88-PheSerGlnThrLeuAsp-93
122-LysValGlnArgGlyGlyAspVal-129
150-ThrLysSerGlyAlaLysSerAlaSerLys-159

Antigenic Index - Jameson-Wolf
23-LeuGlnSerAspSerArgGlnProIle-31
33-IleGluAlaAspGlnGlySerLeuAspGlnAlaAsnGlnSerThrThrPheSerGlyAsn-52
71-ArgGlyGlyLysGlyGlyGluSerValArgAlaGluGlySerProValArgPheSerGlnThrLeuAspGlyG
lyLysGlyThrValArgGlyGlnAlaAsnAsn-105
119-GlyAsnAlaLysValGlnArgGlyGlyAspValAlaGlu-131
137-TyrAsnThrLysThrGluVal-143
148-GlySerThrLysSerGlyAlaLysSerAlaSerLysSerGlyArgValSerVal-165
168-GlnProSerSerThrGlnLysSerGlu-176

Hydrophilic Regions - Hopp-Woods
25-SerAspSerArgGlnProIle-31
33-IleGluAlaAspGlnGlySerLeuAspGlnAlaAsn-44
71-ArgGlyGlyLysGlyGlyGluSerValArgAlaGluGlySerPro-85
92-LeuAspGlyGlyLysGlyThrValArgGlyGlnAla-103
121-AlaLysValGlnArgGlyGlyAspValAlaGlu-131
148-GlySerThrLysSerGlyAlaLysSerAlaSerLysSerGlyArg-162
171-SerThrGlnLysSerGlu-176
215-2
AMPHI Regions - AMPHI
21-SerLeuSerAlaTrpLeuGlyArgIle-29
67-SerAlaLysGlyAlaLysGlnPheProGlu-76

Antigenic Index - Jameson-Wolf
3-ValArgTrpArgTyrGly-8
28-ArgIleSerGluValGluIleGluGluValArgLeuAsnProAspGluProGlnTyrThrMetAspGlyLeuA
spGlyArgArgPheAspGluGlnGlyTyrLeuLys-63
65-HisLeuSerAlaLysGlyAlaLysGlnPheProGluSerSerAspIleHisPheAspSerProHisLeu-87
99-ValGlySerAspGluAlaValTyrHisThrGluAsnLysGlnValLeuPhe-115
123-LysThrAlaAspGlyLysArgGlnAlaGlyLysValGluAlaGluLysLeuHisValAspThrGluSerGln
TyrAlaGlnThrAspThrProVal-154
160-AlaSerHisGlyGlnAlaGlyGlyMetThrTyrAspHisLysThrGly-175
179-PheSerSerLysValLys-184
187-IleTyrAspThrLysAspMet-193

Hydrophilic Regions - Hopp-Woods
29-IleSerGluValGluIleGluGluValArgLeuAsnProAspGluProGlnTyr-46
49-AspGlyLeuAspGlyArgArgPheAspGlu-58
65-HisLeuSerAlaLysGlyAlaLysGlnPheProGluSerSerAspIleHisPhe-82
99-ValGlySerAspGluAlaValTyr-106
108-ThrGluAsnLysGlnValLeu-114
123-LysThrAlaAspGlyLysArgGlnAlaGlyLysValGluAlaGluLysLeuHisValAspThrGluSerGln
TyrAla-148
170-TyrAspHisLysThr-174
187-IleTyrAspThrLysAspMet-193
216-2
AMPHI Regions - AMPHI
6-LysTyrLeuAspTrpAlaArg-12
19-AlaGluGlyLeuArgGluIleAlaAlaGluLeu-29
60-ArgLysMetAlaAla-64
165-LeuGlyAspAlaLeuAlaVal-171
201-ValAlaAspIleMetHis-206
216-LeuGlyThrProLeuLysGlu-222
242-GlyArgLeuLysGlyVal-247
251-GlyAspLeuArgArgLeuPheGlnGluCysAspAsnPheThrGlyLeuSerIle-268
272-MetHisThrHisProLysThrIleSerAla-281
290-LysValMetGlnAlaAsn-295

Antigenic Index - Jameson-Wolf
1-MetAlaGluAsnGlyLysTyr-7
14-ValLeuHisAlaGluAlaGluGlyLeuArgGluIleAlaAlaGluLeuAspLysAsnPhe-33
43-CysLysGlyArgVal-47
51-GlyMetGlyLysSerGlyHisIleGlyArgLysMetAla-63
80-GluAlaAlaHisGlyAspLeu-86

90-ValAspAsnAspVal-94
99-SerAsnSerGlyGluSerAspGluIle-107
113-AlaLeuLysArgLysAspIle-119
125-ThrAlaArgProAspSerThrMetAlaArgHisAlaAsp-137
144-ValSerLysGluAlaCysPro-150
177-ArgAlaPheThrProAspAspPheAla-185
188-HisProAlaGlySerLeuGlyLys-195
203-AspIleMetHisLysGlyGlyGlyLeuProAla-213
216-LeuGlyThrProLeuLysGluAlaIle-224
227-MetSerGluLysGlyLeu-232
237-ValThrAspGlyGlnGlyArgLeuLysGly-246
248-PheThrAspGlyAspLeuArgArgLeuPheGlnGluCysAspAsnPheThr-264
275-HisProLysThrIleSerAlaGluArgLeuAlaThrGluAlaLeuLys-290
303-ThrAspAlaAspGly-307

Hydrophilic Regions - Hopp-Woods
1-MetAlaGluAsnGlyLys-6
14-ValLeuHisAlaGluAlaGluGlyLeuArgGluIleAlaAlaGluLeuAspLys-31
43-CysLysGlyArgVal-47
56-GlyHisIleGlyArgLysMetAla-63
100-AsnSerGlyGluSerAspGluIle-107
113-AlaLeuLysArgLysAspIle-119
126-AlaArgProAspSerThrMetAlaArgHisAlaAsp-137
144-ValSerLysGluAlaCys-149
177-ArgAlaPheThrProAspAspPheAla-185
218-ThrProLeuLysGluAlaIle-224
227-MetSerGluLysGlyLeu-232
239-AspGlyGlnGlyArgLeuLys-245
251-GlyAspLeuArgArgLeuPheGlnGluCysAspAsn-262
277-LysThrIleSerAlaGluArgLeuAlaThrGluAlaLeuLys-290
303-ThrAspAlaAspGly-307
218-2
AMPHI Regions - AMPHI
37-LeuLeuAlaValThr-41
121-AlaLysValValSerThrMet-127
136-ThrMetAspGluIleHisSer-142
190-AlaArgSerTrpTrpArgAsnLeuHisGlyThrPheGlyThrTrpValSerLeuIleLeu-209
223-TrpGlyGlyLysPheValGlnAlaTrpSerGlnPhePro-235
288-AspGluProMetThrLeuGluThrValAspArgPheAlaArgGlu-302
359-TyrAsnProPheGlyLysPheMet-366
377-LeuGlyTrpTrpSerValLeuAlaAsn-385

Antigenic Index - Jameson-Wolf
3-ThrGlnIleLysThrGluAlaAspAsnGlnSerAsnArgArgTyrLeu-18
51-IleThrGlyLysGluGlyGluArgIleHis-60
74-AlaGluAlaAlaArgSerAlaValAsnProGluThrSerSer-87
94-ProArgAlaAspAspMet-99
105-ValAsnAsnGluGlyLysAla-111
125-SerThrMetProArgAsnGlnGlyTrp-133
174-ValLysArgArgGlyIleLysAla-181
183-LeuLeuProSerLysGlyArgAlaArgSerTrpTrp-194
196-AsnLeuHisGlyThrPheGly-202
235-ProAlaGlyLysTrpGlyValGluProAsnProVal-246
255-ValLeuAsnAspGlyLysValLysGlu-263
279-ThrValGlyLysAspGlyIleAsnProAspGluProMetThr-292

294-GluThrValAspArgPheAlaArg-301
303-IleGlyPheLysGlyArgTyrGlnLeuAsnLeuProLysGlyGluAspGly-319
323-LeuSerGlnAspSerMetSerTyr-330
336-PheAlaAspArgThrValHis-342
344-AspGlnTyrSerGlyLysIleLeuAla-352
354-IleArgPheAspAspTyrAsnProPhe-362
404-TrpLysArgArgProThrGlyAla-411
417-ProAlaGlnLysValLysLeu-423

Hydrophilic Regions - Hopp-Woods
3-ThrGlnIleLysThrGluAlaAspAsnGlnSerAsnArgArgTyr-17
52-ThrGlyLysGluGlyGluArgIleHis-60
74-AlaGluAlaAlaArgSerAlaValAsnProGluThrSerSer-87
94-ProArgAlaAspAspMet-99
105-ValAsnAsnGluGlyLysAla-111
175-LysArgArgGlyIleLys-180
186-SerLysGlyArgAla-190
255-ValLeuAsnAspGlyLysValLysGlu-263
279-ThrValGlyLysAspGlyIleAsnProAspGluProMetThr-292
294-GluThrValAspArgPheAlaArg-301
314-ProLysGlyGluAspGly-319
325GlnAspSerMetSer-329
336-PheAlaAspArgThrValHis-342
354-IleArgPheAspAsp-358
405-LysArgArgProThrGly-410
219-2 (included in 218, so delete this one)
AMPHI Regions - AMPHI
37-LeuLeuAlaValThr-41
121-AlaLysValValSerThrMet-127
136-ThrMetAspGluIleHisSer-142
190-AlaArgSerTrpTrpArgAsnLeuHisGlyThrPheGlyThrTrpValSerLeuIleLeu-209
223-TrpGlyGlyLysPheValGlnAlaTrpSerGlnPhePro-235
288-AspGluProMetThrLeuGluThrValAspArgPheAlaArgGlu-302
359-TyrAsnProPheGlyLysPheMet-366
377-LeuGlyTrpTrpSerValLeuAlaAsn-385

Antigenic Index - Jameson-Wolf
3-ThrGlnIleLysThrGluAlaAspAsnGlnSerAsnArgArgTyrLeu-18
51-IleThrGlyLysGluGlyGluArgIleHis-60
74-AlaGluAlaAlaArgSerAlaValAsnProGluThrSerSer-87
94-ProArgAlaAspAspMet-99
105-ValAsnAsnGluGlyLysAla-111
125-SerThrMetProArgAsnGlnGlyTrp-133
174-ValLysArgArgGlyIleLysAla-181
183-LeuLeuProSerLysGlyArgAlaArgSerTrpTrp-194
196-AsnLeuHisGlyThrPheGly-202
235-ProAlaGlyLysTrpGlyValGluProAsnProVal-246
255-ValLeuAsnAspGlyLysValLysGlu-263
279-ThrValGlyLysAspGlyIleAsnProAspGluProMetThr-292
294-GluThrValAspArgPheAlaArg-301
303-IleGlyPheLysGlyArgTyrGlnLeuAsnLeuProLysGlyGluAspGly-319
323-LeuSerGlnAspSerMetSerTyr-330
336-PheAlaAspArgThrValHis-342
344-AspGlnTyrSerGlyLysIleLeuAla-352
354-IleArgPheAspAspTyrAsnProPhe-362

404-TrpLysArgArgProThrGlyAla-411
417-ProAlaGlnLysValLysLeu-423

Hydrophilic Regions - Hopp-Woods
3-ThrGlnIleLysThrGluAlaAspAsnGlnSerAsnArgArgTyr-17
52-ThrGlyLysGluGlyGluArgIleHis-60
74-AlaGluAlaAlaArgSerAlaValAsnProGluThrSerSer-87
94ProArgAlaAspAspMet-99
105-ValAsnAsnGluGlyLysAla-111
175-LysArgArgGlyIleLys-180
186-SerLysGlyArgAla-190
255-ValLeuAsnAspGlyLysValLysGlu-263
279-ThrValGlyLysAspGlyIleAsnProAspGluProMetThr-292
294-GluThrValAspArgPheAlaArg-301
314-ProLysGlyGluAspGly-319
325-GlnAspSerMetSer-329
336-PheAlaAspArgThrValHis-342
354-IleArgPheAspAsp-358
405-LysArgArgProThrGly-410
225-1
AMPHI Regions - AMPHI
23-LeuAlaAspGluLeuThrAsn-29
37-IleLeuArgGlnPhe-41
126-AsnAlaMetGlyLeu-130
151-PheMetGlnHisIlePheLys-157
217-ThrGlyLysAsnIle-221

Antigenic Index - Jameson-Wolf
22-AlaLeuAlaAspGluLeuThr-28
32-SerSerArgGluGlnIleLeu-38
41-PheAlaGluAspGluGlnProVal-48
52-AsnArgAlaProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-66
71-GlyLeuAsnGluGlnProVal-77
81-AsnArgValProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-95
100-GlyLeuAsnGluGlnProVal-106
108-ProValAsnArgAlaProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-124
144-ThrGlyPheAspCysSerGly-150
164-LeuProArgThrSerAlaGluGlnAlaArgMet-174
176-ThrProValAlaArgSerGluLeuGlnProGlyAsp-187
194-LeuGlyGlySerArgIle-199
213-HisAlaProArgThrGlyLysAsnIleGlu-222
225-SerLeuSerHisLysTyrTrpSerGlyLys-234
239-ArgArgValLysLysAsnAspProSerArgPhe-249

Hydrophilic Regions - Hopp-Woods
22-AlaLeuAlaAspGluLeuThr-28
32-SerSerArgGluGlnIleLeu-38
41-PheAlaGluAspGluGlnPro-47
53-ArgAlaProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-66
83-ValProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-95
111-ArgAlaProAlaArgArgAlaGlyAsnAlaAspGluLeuIle-124
166-ArgThrSerAlaGluGlnAlaArgMet-174
178-ValAlaArgSerGluLeuGlnPro-185
216-ArgThrGlyLysAsnIleGlu-222
239-ArgArgValLysLysAsnAspProSerArg-248

226
AMPHI Regions - AMPHI
44-LeuIleAlaTyrLeuLys-49
61-AlaAlaGlnPheIleAspPheTrpLeu-69
98-GlnLeuAlaGlySerValThrGlyIleValThr-108
141-ArgSerIleGlyGlyIleProAlaIleThr-150
157-AlaGlyLeuValGlyGlnIleAlaGlyTyrLys-167
197-GluArgSerArgArg-201

Antigenic Index - Jameson-Wolf
3-GluIleLeuArgGlnProSer-9
25-ValArgThrArgThrGlyAsnIle-32
81-TyrGlnAsnArgArgLysIle-87
117-GlyAlaGluArgGluVal-122
128-SerLysSerValThrAsn-133
139-IleThrArgSerIleGlyGly-145
167-LysMetLeuLysAsnThrVal-173
195-SerLeuGluArgSerArgArgMetAla-203

Hydrophilic Regions - Hopp-Woods
25-ValArgThrArgThr-29
82-GlnAsnArgArgLysIle-87
117-GlyAlaGluArgGluVal-122
195-SerLeuGluArgSerArgArgMetAla-203
227-2
AMPHI Regions - AMPHI
36-GlyValLeuPheAlaLeuLeuGlnAla-44
52-LeuGlnGlnLeuThrAspAlaLeu-59
74-ValIleSerTyrLeuAspLeuIleAlaAspAspTrpPheSer-87
228
AMPHI Regions - AMPHI
24-GluValLysGluAlaValGlnAlaValGlu-33
40-AlaAlaSerAlaAlaGluSerAlaAlaSerAlaValGluGluAlaLysAspGlnValLysAspAla-61
78-GluAlaValThrGluAlaAlaLysAspThrLeuAsnLysAlaAlaAspAlaThrGlnGluAlaAlaAspLysM
etLysAspAlaAla-106

Antigenic Index - Jameson-Wolf
18-SerGlnGluAlaLysGlnGluValLysGluAlaValGln-30
32-ValGluSerAspValLysAspThrAlaAlaSerAlaAlaGluSerAlaAlaSerAlaValGluGluAlaLysA
spGlnValLysAspAlaAlaAlaAspAlaLysAlaSerAlaGluGluAlaValThrGluAlaLysGluAlaValTh
rGluAlaAlaLysAspThrLeuAsnLysAlaAlaAspAlaThrGlnGluAlaAlaAspLysMetLysAspAlaAla
Lys-107

Hydrophilic Regions - Hopp-Woods
18-SerGlnGluAlaLysGlnGluValLysGluAlaValGln-30
32-ValGluSerAspValLysAspThrAlaAlaSerAlaAlaGluSerAlaAlaSerAlaValGluGluAlaLysA
spGlnValLysAspAlaAlaAlaAspAlaLysAlaSerAlaGluGluAlaValThrGluAlaLysGluAlaValTh
rGluAlaAlaLysAspThrLeuAsnLysAlaAlaAspAlaThrGlnGluAlaAlaAspLysMetLysAspAlaAla
Lys-107
230-1
AMPHI Regions - AMPHI
6-GluLysTyrArgThr-10
49-AspHisSerIleAsnAsn-54
56-IleGlnAsnGluGln-60
73-GlnSerLeuLeuGln-77

81-LeuLysGlnGlyAlaLys-86

96-GlnIleLysGlnIleIle-101
133-PheValGluGluIleArgAspGlnPhe-141

144-GlnAsnLeuValAsnLeuVal-150
161-AlaGluGlnLeuIleArgLeuThrGlnValAsnArgThrIleArg-175
184-PheIleAlaGlnVal-188
194-AspLeuGlnLysPheTyrAsn-200
234-GluValLysAsnAlaPheGluGluArgValAlaArgLeu-246
272-ValAlaAspPheAsnLys-277
284-AspAspAlaPheAsnHisProSerSerLeuAlaGluAla-296
319-SerGlyMetProGluAsnLeuIleAsnAlaVal-329
398-LeuAsnGlyGlyLys-402
426-GluAlaTyrAlaGluLeu-431
444-ValArgLeuIleGlyLeuProAlaPro-452
456-GluValGlnAlaValThrProProAspAspIleAla-467
488-LeuLeuIleArgTyrPheAsn-494

Antigenic Index - Jameson-Wolf
4-SerIleGluLysTyrArgThrProAla-12
32-SerHisProGlyAlaAsp-37
42-ValGlyAspGluLysIleSerAspHisSerIle-52
56-IleGlnAsnGluGlnAlaAspGlyGlyGlyProSerArgAspAlaVal-71
80-TyrLeuLysGlnGlyAla-85
92-ValSerSerGluGlnIleLys-98
101-IleValAspAspProAsnPheHisAspAlaAsnGlyLysPheAsp-115
122-TyrLeuSerGlnArgHisMetSerGluAspGlnPheValGluGluIleArgAsp-139
169-GlnValAsnArgThrIleArgSerHisThrPheAsnProAspGluPhe-184
189-LysValSerGluAlaAspLeu-195
199-TyrAsnAlaAsnLysLysAspTyrLeu-207
223-AspPheAlaAspLysGlnThrValSerGluThrGluValLysAsnAlaPheGluGluArgValAlaArg-24
5
247-ProAlaAsnGluAlaLysProSerPheGluGlnGluLysAlaAlaValGluAsnGluLeuLysMetLysLys
AlaValAlaAspPheAsnLysAlaLysGluLysLeuGlyAspAspAlaPheAsnHisProSerSerLeuAlaGluA
laAlaLysAsnSerGlyLeuLysValGluThrGlnGluThrTrpLeuSerArgGlnAspAlaGlnMetSerGlyMe
tProGluAsn-324
330-PheSerAspAspValLeuLysLysLysHisAsnSerGlu-342
355-ArgAlaLysGluValArgGluGluLysThrLeuPro-366
368-AlaGluAlaLysAspAlaValArg-375
377-AlaTyrIleArgThrGluAlaAlaLysLeuAlaGluAsnLysAlaLysAspValLeu-395
399-AsnGlyGlyLysAlaValAsp-405
417-GlnGlnAlaArgGlnSerMetProProGluAlaTyr-428
432-LeuLysAlaLysProAlaAsnGlyLysProAla-442
459-AlaValThrProProAspAspIleAla-467
476-AlaLeuAlaGlnGlnGlnSerAlaAsnThrPhe-486
493-PheAsnGlyLysIleLysGlnThrLysGlyAlaGlnSerValAspAsnGlyAspGlyGln-512

Hydrophilic Regions - Hopp-Woods
6-GluLysTyrArgThr-10
42-ValGlyAspGluLysIleSerAsp-49
56-IleGlnAsnGluGlnAlaAspGlyGlyGlyProSerArgAspAlaVal-71
92-ValSerSerGluGlnIleLys-98
101-IleValAspAspProAsnPhe-107
110-AlaAsnGlyLysPheAsp-115

126-ArgHisMetSerGluAspGlnPheValGluGluIleArgAsp-139
189-LysValSerGluAlaAspLeu-195
200-AsnAlaAsnLysLysAspTyrLeu-207
223-AspPheAlaAspLysGlnThrValSerGluThrGluValLysAsnAlaPheGluGluArgValAlaArg-24
5
247-ProAlaAsnGluAlaLysProSerPheGluGlnGluLysAlaAlaValGluAsnGluLeuLysMetLysLys
AlaValAlaAspPheAsnLysAlaLysGluLysLeuGlyAspAspAlaPhe-287
292-SerLeuAlaGluAlaAlaLysAsnSerGlyLeuLysValGluThrGlnGlu-308
310-TrpLeuSerArgGlnAspAlaGlnMet-318
333-AspValLeuLysLysHisAsnSer-341
355-ArgAlaLysGluValArgGluGluLysThrLeuPro-366
368-AlaGluAlaLysAspAlaValArg-375
377-AlaTyrIleArgThrGluAlaAlaLysLeuAlaGluAsnLysAlaLysAspValLeu-395
417-GlnGlnAlaArgGlnSerMetPro-424
432-LeuLysAlaLysProAlaAsnGly-439
461-ThrProProAspAspIleAla-467
496-LysIleLysGlnThrLysGlyAlaGlnSerValAspAsnGlyAspGlyGln-512
231-1
AMPHI Regions - AMPHI
7-IleAsnArgProTyrGlnLysProAlaGluLeu-17
98-ArgIlePheSerPheProGln-104
209-AlaValAspAsnValLysGlyValAlaVal-218
228-AlaValAlaGlyPheArgArgCysSerAlaAla-238
263-LeuAlaAlaValProArgIleThrGln-271
281-LysProPheHisAspPhePheAsnLeu-289

Antigenic Index - Jameson-Wolf
1-MetSerLysArgLysSerIleAsnArgProTyrGlnLysProAlaGlu-16
18-ProProLeuGlnAsnAsnProProPheTyrArgLysAsnArgArgLeuAsn-34
39-AlaAspGlyGlyCysAlaSerProGlnLysCysArgAlaArgGlyPheGln-55
90-SerAlaValArgProArgArgLeuArg-98
135-MetProArgArgProVal-140
150-PheAlaAspArgAsnLeuArg-156
174-AlaPheArgArgArgAlaGlnVal-181
183-AlaArgThrArgAla-187
194-ArgArgValAspIleArgHisProAspPhe-203
211-AspAsnValLysGly-215
231-GlyPheArgArgCysSerAlaAlaGlyGlyArgValGlyThr-244
246-ValProCysArgAlaGluTyrValGluTyrGlyAsnArgArgProHisArgLeuAlaAla-265
269-IleThrGlnArgThrGlnLysArgGlnGlyAspGlyLysProPhe-283
294-MetProMetProSerGluHis

Hydrophilic Regions - Hopp-Woods
1-MetSerLysArgLysSerIleAsn-8
10-ProTyrGlnLysProAlaGlu-16
26-PheTyrArgLysAsnArgArg-32
45-SerProGlnLysCysArgAlaArgGly-53
92-ValArgProArgArgLeuArg-98
136-ProArgArgProVal-140
150-PheAlaAspArgAsnLeuArg-156
174-AlaPheArgArgArgAlaGlnVal-181
183-AlaArgThrArgAla-187
194-ArgArgValAspIleArgHis-200
231-GlyPheArgArgCysSerAlaAlaGlyGlyArgValGlyThr-244
246-ValProCysArgAlaGluTyr-252

254-GluTyrGlyAsnArgArgProHisArg-262
269-IleThrGlnArgThrGlnLysArgGlnGlyAspGlyLysProPhe-283
232-2
AMPHI Regions - AMPHI
23-GlnPheLeuGlyAlaPheAsnAspAsnVal-32
55-GlyGlnMetLeuAsn-59
74-SerLeuSerGlyGlnLeuGlyAsnLysPheAspLysAlaValLeuAlaArgTrpValLysValLeuGluMetI
leIleMet-100
127-ThrLeuPheGlyProLeuLysTyr-134
160-AlaIleLeuPheGly-164
167-LeuGlyThrAlaValAlaGlyValProProTyrIleValGlyIleLeuVal-183
214-ValArgGlyThrLysSerLeuLeuArgGlu-223
251-LeuProThrPheThrGln-256
319-ArgPheGluGlyLeuAsn-324
340-AlaValMetThrLeuIleGlyPhePheGlyGlyPhePheSerValProLeuTyrThrTrpLeu-360

Antigenic Index - Jameson-Wolf
1-MetTyrAlaLysLysGlyGlyLeuGlyLeuValLysSerArgArgPhe-16
75-LeuSerGlyGlnLeuGlyAsnLysPheAspLys-85
139-AspTyrLeuAspAspLysGluLeuMetMet-148
200-ValProAlaLysAlaAlaAspThrGlnIle-209
215-ArgGlyThrLysSerLeuLeuArgGluThrValArgHisLysPro-229
258-HisLeuGlyGlyAsnAspAsnVal-265
286-LysPheSerArgGluArgLeu-292
316-HisGlyHisArgPheGluGly-322
363-AlaSerSerGluThrPheArgAlaArgAla-372
420-IleLysArgGluArgArgPheLeu-427
431-AlaIleArgLysLysPro-436

Hydrophilic Regions - Hopp-Woods
2-TyrAlaLysLysGlyGly-7
11-ValLysSerArgArgPhe-16
81-AsnLysPheAspLys-85
140-TyrLeuAspAspLysGluLeuMet-147
201-ProAlaLysAlaAlaAspThrGlnIle-209
215-ArgGlyThrLysSerLeuLeuArgGluThrValArgHis-227
286-LysPheSerArgGluArgLeu-292
318-HisArgPheGluGly-322
366-GluThrPheArgAlaArgAla-372
420-IleLysArgGluArgArgPheLeu-427
431-AlaIleArgLysLysPro-436
233-2
AMPHI Regions - AMPHI
61-PheAlaAspLysValGlnThr-67
71-GlnValArgValTrpLysAsn-77
88-AsnGlyValAlaLysLeuLeuGluThr-96
119-AlaLeuThrArgLeuIleGluGlnAlaGlyAsnAla-130
138-IleProIleAlaAspThrLeuLysCysAlaAspGlyGlyAsn-151
180-AlaAlaGluAsnLeuAspGlyIleThrAsp-189

Antigenic Index - Jameson-Wolf
1-MetLysArgLysAsnIle-6
16-AlaArgPheGlyAlaAspLysProLysGlnTyrValGluIleGlySerLysThrValLeu-35
43-GluArgHisGluAlaValAsp-49
56-SerProGluAspThrPheAlaAspLysValGln-66

75-TrpLysAsnGlyGlyGlnThrArgAlaGluThrValArgAsnGlyVal-90
100-AlaGluThrAspAsn-104
109-AspAlaAlaArgCys-113
115-LeuProSerGluAlaLeu-120
123-LeuIleGluGlnAlaGlyAsnAlaAlaGluGlyGly-134
142-AspThrLeuLysCysAlaAspGlyGlyAsnIle-152
155-ThrValGluArgThrSerLeu-161
182-GluAsnLeuAspGlyIleThrAspGluAlaSerAlaValGluLysLeuGlyVal-199
206-GlyAspValArgAsnLeuLysLeuThrGlnProGlnAspAlaTyr-220

Hydrophilic Regions - Hopp-Woods
1-MetLysArgLysAsnIle-6
18-PheGlyAlaAspLysProLysGlnTyrVal-27
43-GluArgHisGluAlaValAsp-49
56-SerProGluAspThrPheAlaAspLysValGln-66
79-GlyGlnThrArgAlaGluThrValArg-87
100-AlaGluThrAspAsn-104
127-AlaGlyAsnAlaAlaGlu-132
142-AspThrLeuLysCysAlaAsp-148
182-GluAsnLeuAspGlyIleThrAspGluAlaSerAlaValGluLysLeuGlyVal-199
206-GlyAspValArgAsnLeuLys-212
234-2
AMPHI Regions - AMPHI
26-ArgSerLeuGluValGluLysValAlaSer-35
68-AspArgLeuGlySerGln-73
83-GlnGlnThrAsnArgPheAsnValLeuAsnArgThrAsn-95
121-GlyAspValThrGluPhe-126
206-AlaValAsnSerLeuValGlnAlaValAsp-215

Antigenic Index - Jameson-Wolf
21-AlaThrGluSerSerArgSerLeuGluValGluLysValAlaSer-35
51-ThrPheAspAsnArgSerSerPhe-58
62-IlePheSerAspGlyGluAspArgLeuGlySerGlnAla-74
83-GlnGlnThrAsnArgPheAsnValLeuAsnArgThrAsn-95
99-LeuLysGlnGluSerGlyIleSerGlyLysAlaHisAsnLeuLysGlyAlaAspTyr-117
121-GlyAspValThrGluPheGlyArgArgAspValGlyAsp-133
140-LeuGlyArgGlyLysSerGlnIle-147
160-AsnThrSerGluIle-164
169-GlnGlyAlaGlyGlu-173
175-AlaLeuSerAsnArgGluIle-181
185-GlyGlyThrSerGlyTyrAspAlaThrLeuAsnGlyLysValLeu-199
214-ValAspAsnGlyAlaTrpGlnProAsnArg-223

Hydrophilic Regions - Hopp-Woods
21-AlaThrGluSerSerArgSerLeuGluValGluLysValAla-34
52-PheAspAsnArgSerSerPhe-58
62-IlePheSerAspGlyGluAspArgLeuGlySerGlnAla-74
99-LeuLysGlnGluSerGlyIleSerGlyLysAlaHisAsn-111
122-AspValThrGluPheGlyArgArgAspValGlyAsp-133
141-GlyArgGlyLysSer-145
176-LeuSerAsnArgGluIle-181
235
AMPHI Regions - AMPHI
8-LeuAlaAlaValLeuAlaLeu-14
18-GlnValGlnLysAlaProAsp-24

86-LeuThrAsnAlaAlaAspIle-92
95-ValArgProGluLysLeuHisGlnIlePhe-104
120-SerTyrGlnIleLeuAspSerValThrThr-129
165-GlyAlaLeuValSerAlaValValAsnGlnIleAlaAsnSerLeuThr-180
187-SerLysThrAlaAlaTyrAsnLeuLeuSerProTyr-198

Antigenic Index - Jameson-Wolf
20-GlnLysAlaProAspPheAspTyrThrSerPheLysGluSerLysProAla-36
43-ProLeuAsnGluSerProAspValAsnGlyThr-53
62-AlaProLeuSerGlu-66
79-GluThrPheLysGlnAsnGlyLeuThrAsn-88
93-HisAlaValArgProGluLysLeu-100
131-SerAlaLysAlaArgLeuValAspSerArgAsnGlyLysGluLeuTrpSerGlySerAlaSerIleArgGlu
GlySerAsnAsnSerAsnSer-161
178-SerLeuThrAspArgGlyTyrGlnValSerLysThrAla-190
202-GlyIleLeuLysGlyProArgPheValGluGluGlnProLys-215

Hydrophilic Regions - Hopp-Woods
20-GlnLysAlaProAspPheAsp-26
29-SerPheLysGluSerLysPro-35
44-LeuAsnGluSerProAspVal-50
93-HisAlaValArgProGluLysLeu-100
131-SerAlaLysAlaArgLeuValAspSerArgAsnGlyLysGluLeuTrp-146
150-AlaSerIleArgGluGlySerAsnAsnSer-159
179-LeuThrAspArgGlyTyrGln-185
207-ProArgPheValGluGluGlnProLys-215

236-2

AMPHI Regions - AMPHI
11-LeuCysThrAlaPheAlaAsp-17
107-PheAlaGlyPheAlaAspCysArgProPhe-116
146-AspAspValProArgPhePheAlaGlyGlu-155
178-AlaAlaCysMetAlaValCysPheGly-186
214-LysValGluGlyIleThrArgIle-221
245-IleArgLeuLeuHisGlyIlePheAsnArgIleLysValAla-258
288-PheAlaAlaValIle-292
311-LeuArgCysAsnAspValAlaAspGlyPheArgHisPhe-323

Antigenic Index - Jameson-Wolf
42-GlyPheSerGlyAsnGlyLysPhe-49
58-ArgHisGlnGlnSerLysAlaGln-65
77-PhePheArgArgGlyAsnPheGlyPheGlyLeuGlnGlyArgThrAspGlyPhe-94
98-GlnArgLeuAspGlyGlyGlyTyr-105
109-GlyPheAlaAspCysArgProPhe-116
126-ValAspGlyArgGluLeuValProSerMetGluGluAspAla-139
145-AlaAspAspValPro-149
155-GluAlaGlnAsnArgCysAsnGlnGluAsnGlnThrAla-167
195-ValGluValGluArgThrGlnValPheArgAlaGluArgAsnAsnValPhe-211
213-GlyLysValGluGlyIleThr-219
261-GlyLysGlnLysAlaGlnGly-267
292-IleGlyArgCysArgProGlnAlaGln-300
312-ArgCysAsnAspValAlaAspGly-319
328-ValAspAsnGluThrMet-333

Hydrophilic Regions - Hopp-Woods
89-GlyArgThrAspGly-93

98-GlnArgLeuAspGlyGlyGly-104
127-AspGlyArgGluLeuValProSerMetGluGluAspAla-139
145-AlaAspAspValPro-149
156-AlaGlnAsnArgCysAsnGlnGluAsnGlnThr-166
195-ValGluValGluArgThrGlnValPheArgAlaGluArgAsnAsn-209
215-ValGluGlyIleThr-219
261-GlyLysGlnLysAlaGlnGly-267
293-GlyArgCysArgProGlnAlaGln-300
312-ArgCysAsnAspValAlaAspGly-319
328-ValAspAsnGluThrMet-333
238
AMPHI Regions - AMPHI
103-ValHisSerProPhe-107
112-SerLysSerThrSerAspPheSerGlyGlyVal-122
129-TyrGlnLeuHisArgThrGlySer-136
141-GluAspGlyTyrAspGlyProGlnGlySer-150
158-AlaArgAspIleTyrSerTyrTyrVal-166
224-AspAspValArgGlyIleValGlnGlyAlaValAsnPro-236
246-IleGlyAlaIleThrAspSerAlaValSerProValThrAspThrAlaAlaGlnGlnThrLeuGlnGlyIle
AsnAspLeuGlyLysLeu-275

"
298-IleAsnSerAlaLysGlnTrpAlaAspAla-307
342-AspTrpValLysAsn-346
351-LysProAlaAlaArgHisMetGlnThrLeu-360
367-GlyAsnLysProIleLysSerLeuProAsn-376
398-PheAspSerValHisLysThrLeuThr-406
465-GlyLysGlnAlaLysAspTyrLeu-472

Antigenic Index - Jameson-Wolf
25-HisAlaAsnGlyLeuAspAlaArgLeuArgAspAspMetGlnAlaLysHisTyrGluProGlyGlyLys-47
53-AsnAlaArgGlySerValLysLysArgValTyr-63
80-ThrHisGluArgThrGlyPheGluGly-88

96-PheSerGlyHisGlyHisGluValHisSerProPheAspHisHisAspSerLysSerThrSerAspPheSerG
lyGlyValAspGlyGly-125
131-LeuHisArgThrGlySerGluIleHisProGluAspGlyTyrAspGlyProGlnGlySerAspTyrProPro
ProGlyGlyAlaArgAsp-160

166-ValLysGlyThrSerThrLysThrLysThr-175

182-ProPheSerAspArgTrpLeuLysGluAsnAlaGlyAla-194
200-SerArgAlaAspGluAlaGly-206
210-TrpGluSerAspProAsnLysAsnTrp-218

221-AsnArgMetAspAspValArgGlyIle-229

268-GlyIleAsnAspLeuGlyLysLeuSerProGluAlaGln-280
292-PheAlaValLysAspGlyIleAsnSerAlaLysGlnTrpAla-305
307-AlaHisProAsnIle-311
329-TrpArgGlyLysLysValGluLeuAsnProThrLysTrpAspTrpValLysAsnThrGlyTyrLysLysPro
AlaAlaArg-355

360-LeuAspGlyGluMetAlaGlyGlyAsnLysProIleLysSerLeuProAsnSerAlaAlaGluLysArgLys
GlnAsnPheGluLysPheAsnSerAsnTrpSer-394

396-AlaSerPheAspSerValHisLysThrLeuThrProAsnAla-409
413-LeuSerProAspLysValLysThrArgTyrThrSerLeuAspGlyLysIleThrIleIleLysAspAsnGlu
AsnAsnTyr-439

441-ArgIleHisAspAsnSerArgLysGlnTyrLeuAspSerAsnGlyAsnAlaValLysThrGlyAsnLeuGln
GlyLysGlnAlaLysAspTyrLeuGln-473

476-ThrHisIleArgAsnLeuAspLys-483

Hydrophilic Regions - Hopp-Woods
29-LeuAspAlaArgLeuArgAspAspMetGlnAlaLysHisTyrGluProGlyGly-46
54-AlaArgGlySerValLysLysArgValTyr-63
80-ThrHisGluArgThrGlyPhe-86
108-AspHisHisAspSerLysSerThrSerAspPhe-118

133-ArgThrGlySerGluIleHisProGluAspGlyTyrAspGlyProGlnGlySerAspTyrProPro-154
156-GlyGlyAlaArgAsp-160
169-ThrSerThrLysThrLysThr-175
186-ArgTrpLeuLysGluAsnAlaGly-193
200-SerArgAlaAspGluAlaGly-206
222-ArgMetAspAspValArgGly-228
271-AspLeuGlyLysLeuSerPro-277

296-AspGlyIleAsnSer-300
329-TrpArgGlyLysLysValGluLeuAsnProThr-339
347-ThrGlyTyrLysLysProAlaAlaArg-355
360-LeuAspGlyGluMetAlaGlyGlyAsnLysProIleLys-372
377-SerAlaAlaGluLysArgLysGlnAsnPheGluLysPheAsn-390
414-SerProAspLysValLysThrArgTyrThrSerLeuAspGlyLysIleThrIleIleLysAspAsnGluAsn
Asn-438
443-HisAspAsnSerArgLysGlnTyrLeu-451

454-AsnGlyAsnAlaValLys-459

462-AsnLeuGlnGlyLysGlnAlaLysAspTyrLeu-472
479-ArgAsnLeuAspLys-483

239-2
AMPHI Regions - AMPHI
49-PheArgLeuIleGlnSerCys-55
72-AsnAlaHisArgLysGln-77
123-ProGlyPheAsnAlaLeuProThrIlePhe-132
165-SerSerAsnGluTrp-169
221-PheCysAlaThrIleCysAlaSerLeuArg-230

Antigenic Index - Jameson-Wolf
6-GlyIleAlaArgAsnArgArgMetGlu-14
19-CysArgArgProAspArgPheValValArgGlnThrArgLeuLeu-33
53-GlnSerCysGluIleGluPro-59
66-HisAsnGlyLysSerGlyAsnAlaHisArgLysGlnGlnLysGluIle-81
100-ProAlaValArgSerAlaThrArgLysThrAla-110
132-PheArgGlySerSerGlyLysSerAlaSer-141
144-AlaAlaGlnArgGlyArgGlyAlaCys-152
164-ArgSerSerAsnGluTrpLys-170

173-ThrAlaLysArgProProSerPheArgArgHisMetThrCysGlyAsnThrAlaProThrSerSerSerSer
ArgLeuIleLysMet-201
209-ValAlaGlySerCysProArgSerArgValArgThr-220
245-ArgAlaIleArgArgLeuAsnArgSerSerPro-255

Hydrophilic Regions - Hopp-Woods
6-GlyIleAlaArgAsnArgArgMetGlu-14
20-ArgArgProAspArgPheValValArgGlnThrArg-31
67-AsnGlyLysSerGlyAsnAlaHisArgLysGlnGlnLysGluIle-81
102-ValArgSerAlaThrArgLysThrAla-110
135-SerSerGlyLysSerAlaSer-141
146-GlnArgGlyArgGlyAlaCys-152
165-SerSerAsnGluTrpLys-170
173-ThrAlaLysArgProProSerPheArgArgHisMet-184
193-SerSerSerSerArgLeuIleLysMet-201
211-GlySerCysProArgSerArgValArgThr-220
245-ArgAlaIleArgArgLeuAsnArgSerSerPro-255
240-2
AMPHI Regions - AMPHI
19-AlaAspValGlyArgPheLeuHis-26
63-IleGlnCysLeuArgAsnHis-69
87-AlaProLeuPheAlaValCysPro-94
107-GlnGlyGluAspPheProArgAlaGlyIleGlnAsnHis-119
154-ValPheArgGlyPheIleAlaArgGlyValGlnAlaValHisAsn-168
188-PheLysArgLysPheGln-193

Antigenic Index - Jameson-Wolf
9-GlyThrGluThrArgArgGlnPheAla-17
39-IleAlaHisGlyArgArgSerAspPheIleArg-49
67-ArgAsnHisLysArgPheAspCysArgThrGlyPheAsp-79
101-ValGlyGlyArgIleGlyGlnGlyGluAspPheProArgAlaGlyIleGlnAsnHisHisArgSerGly-12
3
139-GlnGlyLeuAsnProLeuIleGluGlyLysAspAspVal-151
173-ValProGlnAsnAspPheArg-179
187-ValPheLysArgLysPhe-192
201-AsnIleGlyLysSerAspAspValCysLys-210

Hydrophilic Regions - Hopp-Woods
10-ThrGluThrArgArgGlnPheAla-17
41-HisGlyArgArgSerAspPheIleArg-49
67-ArgAsnHisLysArgPheAspCys-74
105-IleGlyGlnGlyGluAspPheProArg-113
145-IleGluGlyLysAspAspVal-151
187-ValPheLysArgLysPhe-192
203-GlyLysSerAspAspValCysLys-210
241-1
AMPHI Regions - AMPHI
6-ThrArgAlaAlaAsnProPro-12
35-ThrArgThrProArgGluProAlaSer-43
109-PheLeuIleGlyCysIleAla-115
126-PheHisAlaCysGlnArgMetValAlaVal-135
194-ArgHisIleAspArgIleAlaGlyIleLeuThrValGln-206
229-PheValGlnLysLeuIleValGlyIleIleHis-239

Antigenic Index - Jameson-Wolf

1-MetProThrArgProThrArgAlaAlaAsnProProThrProProThr-16
23-CysProArgProProTyrArgProProSerValGlnThrArgThrProArgGluProAlaSerSerThrCysA
laAlaLysSerAlaAsnArgArgGluAsnSerHisAsnAlaGlnPro-62
68-ProSerAsnLysMetProSerGluThrGluGlnThrLeuPheArgArgHisGlnIleProProSerCysArgG
lnSer-93
122-LeuLysAlaAspPhe-126
147-ThrIleAspAspAsnIleAla-153
166-PheAspPheAsnArgGluHisAlaArgIlePheAspThrAspGlnLeu-181
188-ArgIleValGlyArgGlnArgHisIleAspArgIleAla-200
209-PheHisGlnArgGluAsnAla-215
244-ArgAsnHisGlyIle-248
250-HisAspSerHisIleCysProPheArgAsnSerArgLeuIle-263

Hydrophilic Regions - Hopp-Woods
1-MetProThrArgProThrArgAlaAlaAsn-10
32-SerValGlnThrArgThrProArgGluProAlaSer-43
46-CysAlaAlaLysSerAlaAsnArgArgGluAsnSerHis-58
70-AsnLysMetProSerGluThrGluGlnThrLeuPheArg-82
122-LeuLysAlaAspPhe-126
166-PheAspPheAsnArgGluHisAlaArgIlePheAsp-177
188-ArgIleValGlyArgGlnArgHisIleAspArgIleAla-200
209-PheHisGlnArgGluAsnAla-215
242
AMPHI Regions - AMPHI
23-SerGluValValThrGlnPheValAspPheValGlu-34
42-AlaGlyPheCysHisIleLeuGlnAsn-50
100-AlaAspGlnAlaGln-104
122-AsnProPhePheAspPheGlnAlaValVal-132
137-HisGlnSerGlyPheGlyAspValPhe-145
156-LeuGluGlnSerVal-160
177-PheGluLeuPheGln-181
191-PheGlyHisThrArgLeuPheAspIleCys-200
262-HisProPheAlaAspPheGlyAsnPheGlnAsnLeuLeuAlaLeu-276

Antigenic Index - Jameson-Wolf
13-HisPheGluGlnArgAlaGlyGlyIleAla-22
33-ValGluGlnGluGln-37
52-ThrGlyHisArgAlaAspIle-58
75-SerHisAlaAspIlePheProProArgCysPheGlyAspGlyPheAlaGlnArgGlyPheAlaHisAlaArgA
rgAlaAspGlnAlaGlnAsnArgAla-107
137-HisGlnSerGlyPhe-141
154-ArgGlnLeuGluGlnSerVal-160
164-AlaTyrAspGlyGlyPheArgArgHisArgTrpHis-175
283-MetArgCysAspArgIleGly-289

Hydrophilic Regions - Hopp-Woods
13-HisPheGluGlnArgAlaGlyGlyIle-21
33-ValGluGlnGluGln-37
52-ThrGlyHisArgAlaAspIle-58
95-AlaHisAlaArgArgAlaAspGlnAlaGlnAsnArgAla-107
154-ArgGlnLeuGluGlnSerVal-160
167-GlyGlyPheArgArgHisArg-173
283-MetArgCysAspArgIleGly-289
243
AMPHI Regions - AMPHI

35-IleThrArgLeuAlaArgLysAlaValGlnArgLeuThr-47
50-HisIleGlnXxxPhePheThrGlu-57
80-AspSerSerArgIleThrSerThrIle-88

Antigenic Index - Jameson-Wolf
29-LeuProSerAsnAlaPro-34
37-ArgLeuAlaArgLysAlaValGln-44
58-SerHisThrGlyAlaAsnArgSerSerSerSerCysLysPro-71
77-SerAlaSerAspSerSerArgIle-84
102-SerThrThrGlyAlaValThrLysSer-110

Hydrophilic Regions - Hopp-Woods
37-ArgLeuAlaArgLysAlaValGln-44
59-HisThrGlyAlaAsnArgSerSerSerSerCysLys-70
78-AlaSerAspSerSerArgIle-84
244-2
AMPHI Regions - AMPHI
22-LysCysPheLeuGlnLeuValGln-29
31-HisLeuHisAlaHis-35
109-IleSerArgLeuCysGlySerLeuPhe-117
126-CysLeuAspGlyPheHisArgLeuHis-134
137-AsnArgPhePheThr-141
165-TyrProArgLysIleArgThrPheSerArgAsnPheLysGlnLys-179

Antigenic Index - Jameson-Wolf
1-MetAspIleArgIle-5
11-PheArgValAspPheLeuAsp-17
45-IleGlnLysArgHis-49
54-LeuAspArgGlnHisPheHisGlyLysLeuLeuSerGlyGluLeuValArg-70
99-GlnLeuGlyAsnProArgLeu-105
154-LeuLysThrAsnTrpLysSerLysSerSerTyrTyrProArgLysIleArgThrPheSerArgAsnPheLys
GlnLysGlnArgIleSerAsnSerPheSerAsnProLeuProLysLys-193

Hydrophilic Regions - Hopp-Woods
1-MetAspIleArgIle-5
11-PheArgValAspPheLeuAsp-17
156-ThrAsnTrpLysSerLysSer-162
167-ArgLysIleArgThrPheSerArgAsnPheLysGlnLysGlnArgIle-182
246-2
AMPHI Regions - AMPHI
39-AlaValAsnIleAlaGlnCysPheThr-47
67-GluGlnPheAlaAsnLeuPhePhe-74
83-AspMetGlyArgPhe-87
132-PheGlyCysAspAspValValAspAsnLeuAlaGlyPheGlyArg-146
156-GlnLeuSerGlnValPhePheGlnLeuLeuGln-166

Antigenic Index - Jameson-Wolf
1-MetHisGlyArgTyrGlyGlyThrGln-9
18-GlnThrGlnArgThrCysPheSerAsnGlyLysValTyr-30
34-ThrAspIleGlySer-38
59-GlnArgArgThrGluValLeu-65
78-AspSerArgHisHisAspMetGlyArg-86
92-LeuAspAspGluLeuAla-97
133-GlyCysAspAspValValAspAsn-140
143-GlyPheGlyArgGlyPhe-148

Hydrophilic Regions - Hopp-Woods
59-GlnArgArgThrGluValLeu-65
78-AspSerArgHisHisAspMet-84
92-LeuAspAspGluLeuAla-97
247-1
AMPHI Regions - AMPHI
12-SerTyrAspGlyMetLysGlyPheThrIleIle-22
25-LeuValAlaGlyLeuLeuSerMetIleValLeu-35
48-LeuAsnAspAlaAlaAsn-53
81-CysPheAsnMetSerGlu-86
123-AsnTyrGlnAsnPhePheGln-129
150-ThrValValSerSerCysAlaAlaIleSerLysProGlyLysGlnIleProThrLeu-168
256-LysTyrThrAspLysPheAspSerAla-264

Antigenic Index - Jameson-Wolf
1-MetArgArgLysMetLeuAsnValProLysGlySerTyrAspGlyMetLys-17
42-TyrPheThrSerArgLysLeuAsnAspAlaAlaAsnGluArgLeuAlaAla-58
60-GlnAspLeuArgAsn-64
71-ArgAspAlaArgMetAlaGlyGlyPhe-79
83-AsnMetSerGluHisProAlaThrAspValIleProAspThrThrGlnGlnAsnSerProPheSerLeuLysA
rgAsnGlyIleAspLys-112
117-AlaGluSerSerAsnIleAsnTyrGln-125
140-IleAspAspValAsnAlaSerThr-147
157-AlaIleSerLysProGlyLysGlnIleProThrLeuGluAspAlaLysLysGluLeuLysIleProAspGln
AspLysGluGlnAsnGlyAsnIleAlaArgGlnArgHis-193
202-ArgIleAlaAspGluGluGlyLeu-209
212-PheGlnLeuAspAspLysGlyLysTrpGlyAsn-222
228-LysLysValArgHisMetLys-234
242-GlyCysProGluAspAspAlaGlyLysGluGluThrPheLysTyrThrAspLysPheAspSerAlaGln
-265
279-SerGlyThrAspThrLysIleAlaAlaSerSerAspAsnHis-292
300-AlaThrIleArgGlyGlyAsnValCysAlaAsnArgThrLeu-313

Hydrophilic Regions - Hopp-Woods
1-MetArgArgLysMetLeuAsn-7
11-GlySerTyrAspGly-15
46-ArgLysLeuAsnAspAlaAlaAsnGluArgLeuAlaAla-58
60-GlnAspLeuArgAsn-64
71-ArgAspAlaArgMet-75
104-SerLeuLysArgAsnGlyIleAspLys-112
140-IleAspAspValAsnAla-145
159-SerLysProGlyLysGln-164
166-ProThrLeuGluAspAlaLysLysGluLeuLysIleProAspGlnAspLysGluGlnAsnGlyAsnIleAla
ArgGlnArgHis-193
202-ArgIleAlaAspGluGluGlyLeu-209
213-GlnLeuAspAspLysGlyLysTrpGly-221
228-LysLysValArgHisMetLys-234
243-CysProGluAspAspAlaGlyLysGluGluThrPheLysTyrThrAspLysPheAspSerAlaGln-26
5
280-GlyThrAspThrLysIleAlaAlaSerSerAsp-290
248-2
Hydrophilic Regions - Hopp-Woods
1-MetArgArgLysMetLeuAsn-7
11-GlySerTyrAspGly-15

46-ArgLysLeuAsnAspAlaAlaAsnGluArgLeuAlaAla-58
60-GlnAspLeuArgAsn-64
71-ArgAspAlaArgMet-75
104-SerLeuLysArgAsnGlyIleAspLys-112
140-IleAspAspValAsnAla-145
159-SerLysProGlyLysGln-164
166-ProThrLeuGluAspAlaLysLysGluLeuLysIleProAspGlnAspLysGluGlnAsnGlyAsnIleAla
ArgGlnArgHis-193
202-ArgIleAlaAspGluGluGlyLeu-209
213-GlnLeuAspAspLysGlyLysTrpGly-221
228-LysLysValArgHisMetLys-234
243-CysProGluAspAspAspAlaGlyLysGluGluThrPheLysTyrThrAspLysPheAspSerAlaGln-26
5
280-GlyThrAspThrLysIleAlaAlaSerSerAsp-290

Antigenic Index - Jameson-Wolf
1-MetArgLysGlnAsnThrLeuThr-8
11-ProThrSerAspGlyGlnArgGly-18
40-GlnSerTyrAsnThrGluGlnArgIleSerAlaAsnGluSerAspArgLysLeuAla-58
64-AlaAlaLeuArgGluGlyGluLeuGln-72
76-LeuGluTyrAspThrAspSerLysValThrPheSerGluAsnCysGlyLysGlyLeu-94
99-AsnValArgThrAsnAsnAspAsnGluGluAlaPhe-110
116-GlnGlyLysProThrValGluAlaValLysArgSerCysProAlaAsnSerThrAspLeuCysIleAspLys
LysGlyMetGluTyrLysLysGlyThrArgSerValSerLysMetProArgTyr-157
162-LeuGlyValLysAsnGlyGluAsnValTyr-171
177-AlaTrpGlyLysAsnAlaAsnThr-184
192-ValSerAsnAsnAspGlu-197

Hydrophilic Regions - Hopp-Woods
1-MetArgLysGlnAsnThr-6
11-ProThrSerAspGlyGlnArg-17
42-TyrAsnThrGluGlnArgIleSerAlaAsnGluSerAspArgLysLeuAla-58
64-AlaAlaLeuArgGluGlyGluLeuGln-72
76-LeuGluTyrAspThrAspSerLysValThrPhe-86
101-ArgThrAsnAsnAspAsnGluGluAlaPhe-110
119-ProThrValGluAlaValLysArgSerCysPro-129
135-LeuCysIleAspLysLysGlyMetGluTyrLysLysGlyThrArgSerValSerLysMetPro-155
165-LysAsnGlyGluAsnValTyr-171
193-SerAsnAsnAspGlu-197
249-1
AMPHI Regions - AMPHI
6-CysPheArgLeuLys-10
17-AlaLeuIleGluValLeuVal-23
42-ThrValAlaSerValArgGluAla-49
53-ThrIleValSerGlnIleThrGlnAsnLeuMetGluGlyMet-66

Antigenic Index - Jameson-Wolf
1-MetLysAsnAsnAspCysPheArgLeuLysAspSerGlnSerGlyMetAla-17
44-AlaSerValArgGluAlaGluThr-51
70-ProThrIleAspSerAspSerAsnLysLysAsnTyr-81
93-ValAspGlyAspPheAla-98
101-AlaMetLysThrLysGlyGlnLeuAla-109
134-ValCysLysAspSerSerGlyAsnAlaProThrLeuSer-146
148-AsnAlaPheSerSerAsnCysAspAsnLysAlaAsnGlyAspThrLeu-163
171-AspSerAlaGlyAspSerAspIleSerArgThrAsnLeuGluValSerGlyAspAsn-189

196-AlaArgValGlyGlyArgGlu-202

Hydrophilic Regions - Hopp-Woods
1-MetLysAsnAsnAspCysPheArgLeuLysAspSerGlnSer-14
44-AlaSerValArgGluAlaGluThr-51
72-IleAspSerAspSerAsnLysLysAsn-80
101-AlaMetLysThrLysGlyGlnLeuAla-109
134-ValCysLysAspSerSerGly-140
153-AsnCysAspAsnLysAlaAsnGly-160
172-SerAlaGlyAspSerAspIleSerArgThrAsnLeu-183
198-ValGlyGlyArgGlu-202
250-2
AMPHI Regions - AMPHI
34-PheAlaGlyGlySerGlu-39
41-AlaThrValAsnLeuTrpAlaGluPro-49
123-LeuThrLysThrSerThrAlaLeuPro-131

Antigenic Index - Jameson-Wolf
14-MetGlnGlyGlyGlnLysGlyMetSer-22
35-AlaGlyGlySerGlu-39
80-IleProLeuLysLysAlaVal-86
103-GluIleGlnLysArgLysAlaAla-110
119-PheTyrSerGlyLeuThrLysThrSerThrAlaLeuProArgLeuSerSerLysLysThrIle-139

Hydrophilic Regions - Hopp-Woods
80-IleProLeuLysLysAlaVal-86
103-GluIleGlnLysArgLysAlaAla-110
133-LeuSerSerLysLysThrIle-139
251
AMPHI Regions - AMPHI
59-AlaTyrGlyAspProIleGlyAlaGlyPhe-68
114-GlnValValAlaAspPheGlyGlyIleGluGlyPhe-125
160-ArgThrValGlyArgThrValArgLeuLeuLysMetIle-172
215-AlaArgThrValPheArgAlaHis-222
260-LeuGlyGlnGluCysArg-265
267-ArgHisIleAlaArgValGluSerLeuLeuArgValPheGluTyrAlaAlaAsp-284

Antigenic Index - Jameson-Wolf
10-AlaArgAlaAspIleArgProProAlaGlnThrAspIleValProAsnCys-26
34-AspAlaAlaArgArgAlaValArg-41
49-AlaAspLeuProArgAsnAspIleSerProAlaTyrGlyAspProIleGlyAlaGly-67
80-LeuArgGlyArgValArgArgIleGly-88
101-GluIleArgAlaLysAlaValLysProGluIle-111
149-ArgLeuValGlyThr-153
161-ThrValGlyArgThrValArg-167
179-ProValArgGluAlaGlyIle-186
212-ValLysHisAlaArgThrValPhe-219
244-ValThrGlyGlnArgThrArg-250
256-IleLysAsnArgLeuGlyGlnGluCysArgAsnArgHisIleAlaArgValGluSer-274
290-LeuLysThrLysThrArgAlaGluGlnProArgProAlaPhe-303

Hydrophilic Regions - Hopp-Woods
10-AlaArgAlaAspIleArgProProAlaGln-19
34-AspAlaAlaArgArgAlaValArg-41
50-AspLeuProArgAsnAspIle-56

82-GlyArgValArgArgIleGly-88
101-GluIleArgAlaLysAlaValLysProGluIle-111
161-ThrValGlyArgThrValArg-167
179-ProValValArgGluAlaGlyIle-186
212-ValLysHisAlaArgThrValPhe-219
258-AsnArgLeuGlyGlnGluCysArgAsnArgHisIleAlaArgValGluSer-274
292-ThrLysThrArgAlaGluGlnProArg-300
254-2
AMPHI Regions - AMPHI
6-ArgPheAsnThrTyrSerHis-12
32-GlyHisGlyAspGlyTyrArg-38
66-LysLeuLysSerIleLeuLys-72
142-ValLeuAlaValMetLysSerLeuThrAlaSerLeuPro-154

Antigenic Index - Jameson-Wolf
2-TyrThrGlyGluArgPheAsnThrTyrSer-11
32-GlyHisGlyAspGlyTyrArg-38
65-GlyLysLeuLysSerIleLeuLysLysThrAspHis-76
94-SerLeuArgAsnGlyProGly-100
120-ThrIleGlyArgLysSerGluLysArgLeu-129
177-AsnAspGluLysIleArgHisGlyHisGly-186

Hydrophilic Regions - Hopp-Woods
65-GlyLysLeuLysSerIleLeuLysLysThrAspHis-76
120-ThrIleGlyArgLysSerGluLysArgLeu-129
177-AsnAspGluLysIleArgHis-183

255

AMPHI Regions - AMPHI
23-ValLysThrCysAlaAspPheHisAlaPheAspGlyValAspAlaHisHisArg-40
71-GlyIleGlnGlyPheAlaHis-77
139-AlaGlyGlyGlyPhe-143

Antigenic Index - Jameson-Wolf
33-AspGlyValAspAlaHisHisArgValGlyAspPheGly-45
48-AlaValLysAsnArgPheAlaGlnAlaAspArgAspIleGlyCys-62
66-GlnLeuArgAlaAspGlyIleGln-73
91-ValGlyGlyLysLysArgIleLeu-98
115-GlyAsnValGlyGlyAspPheArgAla-123
130-PhePheGlyAsnGlySerGlySerAsnAlaGlyGly-141
143-PheThrGlyGlyAla-147
169-GlyAlaGluAlaGlyGly-174

Hydrophilic Regions - Hopp-Woods
33-AspGlyValAspAlaHisHisArgValGlyAspPheGly-45
48-AlaValLysAsnArgPheAlaGlnAlaAspArgAspIleGly-61
66-GlnLeuArgAlaAspGly-71
92-GlyGlyLysLysArgIleLeu-98
119-GlyAspPheArgAla-123
135-SerGlySerAsnAla-139
169-GlyAlaGluAlaGlyGly-174

256-1
AMPHI Regions - AMPHI

90-GlyValValValHisPheArgSerCysGlyGlyIleAlaAsn-103
127-ArgTyrArgGluIleTyrAlaVal-134
141-AsnAlaLeuAlaLysTyrLeuGlyGluGln-150
173-ArgArgPheAspSerGlyIleThrArgLeuLeu-183
197-LysSerLeuGlnGlyPheGlnThrAla-205
207-AlaAlaGlyCysLysThrLeuGlyGluPheAspAspArgPheThrAlaProLeuHisGly-226
233-TyrTyrArgGlnThrSerCysLysProLeuLeuLysHisValAla-247
267-ProArgAlaAspGluValSer-273

Antigenic Index - Jameson-Wolf
4-ThrProProAspThrProPhe-10
12-LeuArgAsnGlyAsnAlaAspThrIleAla-21
24-PheLeuGlnArgProAlaProAlaTyrArgArgGluLeuLeuProAspSerThrGlyLysThrLysVal-46
49-AspPheSerAspGlyIleSerProAspAla-58
67-LeuGluGlySerSerArgSerHisTyr-75
82-AlaValArgAspArgGlyTrpHis-89
112-GlyAspThrAlaGlu-116
147-LeuGlyGluGlnGlyLysLysAlaLeu-155
166-ValAspAlaGluAlaAlaGlyArgArgPheAspSerGlyIleThr-180
192-LeuIleProLysAlaLysSerLeuGln-200
212-ThrLeuGlyGluPheAspAspArgPheThr-221
227-PheAlaAspArgHisAspTyrTyrArgGlnThrSerCysLysProLeuLeu-243
259-ProPheLeuProProGluAlaLeuProArgAlaAspGluValSerGlu-274
291-SerSerThrGlyGlyArgLeu-297
311-AspSerPheArgThrAsnArgArg-318

Hydrophilic Regions - Hopp-Woods
30-ProAlaTyrArgArgGluLeuLeuPro-38
40-SerThrGlyLysThrLysVal-46
68-GluGlySerSerArgSer-73
83-ValArgAspArgGlyTrp-88
147-LeuGlyGluGlnGlyLysLysAlaLeu-155
166-ValAspAlaGluAlaAlaGlyArgArgPheAspSerGlyIle-179
192-LeuIleProLysAlaLysSer-198
212-ThrLeuGlyGluPheAspAspArgPheThr-221
227-PheAlaAspArgHisAspTyrTyrArg-235
265-AlaLeuProArgAlaAspGluValSerGlu-274
313-PheArgThrAsnArgArg-318
257-2
AMPHI Regions - AMPHI
24-SerPheLeuProAsn-28
73-AspLeuValAsnLysValLeuAlaGluValAlaArgLeuGluLysIleValGlnProLeu-92

Antigenic Index - Jameson-Wolf
1-MetGlyArgHisPheGlyArgArgArgPhe-10
31-AlaAlaAspAspGluLysArgAsnGlyAspGluLysArgAsnGluAsn-46
56-GlySerGlyAlaGlu-60
65-GlyValAspAspArgArgAlaAlaAspLeuVal-75
83-AlaArgLeuGluLysIleVal-89

Hydrophilic Regions - Hopp-Woods
4-HisPheGlyArgArgArgPhe-10
31-AlaAlaAspAspGluLysArgAsnGlyAspGluLysArgAsnGlu-45
65-GlyValAspAspArgArgAlaAlaAspLeuVal-75
83-AlaArgLeuGluLysIleVal-89

259-1
AMPHI Regions - AMPHI
154-TyrGlyArgValPheAlaAspIlePheGluLeuSer-165
172-AlaPheLysGlyMetLeuLysLeuThrAlaGluTyrLysAsnIlePheGlyAspAlaCysArg-192
203-AsnGlnAlaLeuGlnGluIleSerLysThrSerGlu-214

Antigenic Index - Jameson-Wolf
34-LysAlaTyrThrGluGluLeuProPro-42
61-SerAlaArgSerLysAlaLysAlaGluLysPheTyrArgGluLysMetIleGln-78
93-LeuGluHisLysPro-97
105-LysAsnHisGlyLysGlyMetAlaGluGlnValArgPheLysAla-119
121-ValLeuProAspAspGluAspAlaArgThrIleAla-132
144-GlyThrAspAlaValAlaSerGlyGluThrTyrGlyArgVal-157
168-LeuGluGlyArgAlaPhe-173
189-AspAlaCysArgSerGluThrAlaLeu-197
208-GluIleSerLysThrSerGluLysSerLysArg-218

Hydrophilic Regions - Hopp-Woods
35-AlaTyrThrGluGluLeuPro-41
62-AlaArgSerLysAlaLysAlaGluLysPheTyrArgGluLysMetIleGln-78
93-LeuGluHisLysPro-97
106-AsnHisGlyLysGlyMetAlaGluGlnValArgPheLysAla-119
121-ValLeuProAspAspGluAspAlaArgThrIleAla-132
168-LeuGluGlyArgAlaPhe-173
189-AspAlaCysArgSerGluThrAlaLeu-197
208-GluIleSerLysThrSerGluLysSerLysArg-218

260-2
AMPHI Regions - AMPHI
12-ProPheSerSerLeuPheArgAlaLeuPhe-21
53-PheIleAspSerValGlyGlnValAlaAlaArgLeuPheGlnAlaPhe-68
158-GlnValGlyIleValAspLeuIlePro-166
175-LeuProArgAlaValGln-180

Antigenic Index - Jameson-Wolf
20-LeuPheGluAspArgValGlyIle-27
30-GlyAlaHisAspAlaAlaGlu-36
38-AspPheLeuProGluGluPheThrArg-46
80-ProAlaPheArgAlaArgGluGlnAlaArgArgGlySerGly-93
97-GlyAsnAspLeuArgMetProHisLysAspAlaValGluValAspIleAspGlyGlyAsnThrVal-118
126-ThrHisPheAspAspGlyAspAla-133
139-AlaGluAlaArgPhe-143
184-ArgAsnAlaProGlnGly-189
196-ValAlaPheArgArgValArgAla-203

Hydrophilic Regions - Hopp-Woods
20-LeuPheGluAspArgValGlyIle-27
30-GlyAlaHisAspAlaAlaGlu-36
82-PheArgAlaArgGluGlnAlaArgArgGlySer-92
98-AsnAspLeuArgMetProHisLysAspAlaValGluValAspIleAspGly-114
127-HisPheAspAspGlyAspAla-133
139-AlaGluAlaArgPhe-143
196-ValAlaPheArgArgValArgAla-203
261
AMPHI Regions - AMPHI

22-GlnIlePheArgGln-26
32-AspThrAlaArgAlaPheAlaAlaAla-40
50-GlyLeuLeuAlaAspIle-55
94-ArgPheAspLysHis-98
137-AlaValTyrLysGlyIleArgAsnAlaValPhe-147
158-GlnGlyIleValArgAsnLeu-164
203-AspValPheAlaProVal-208
212-CysLeuAsnGlnAlaGlyGly-218

Antigenic Index - Jameson-Wolf
40-AlaAlaAspAspAlaVal-45
62-ValArgGlnArgProArgLeuArgLeu-70
74-HisGlnArgArgValAspLeu-80
86-ArgGlnIleLysGlyAsnValHisArgPheAspLysHisVal-99
111-AlaHisAlaArgAspAspValProTyr-119
126-AsnArgGlyIleGluGlnGluLysArgVal-135
149-SerPheAspGlyGlyGly-154
181-ArgAsnProAlaGly-185
197-LeuGluSerAsnGlyLeuAsp-203
214-AsnGlnAlaGlyGlyArgIleLeuThrAlaArgLysAspAspGlnGlyLeu-230

Hydrophilic Regions - Hopp-Woods
40-AlaAlaAspAspAlaVal-45
62-ValArgGlnArgProArgLeuArgLeu-70
74-HisGlnArgArgValAspLeu-80
91-AsnValHisArgPheAspLysHisVal-99
112-HisAlaArgAspAspValPro-118
127-ArgGlyIleGluGlnGluLysArgVal-135
221-LeuThrAlaArgLysAspAspGlnGly-229
263-2
AMPHI Regions - AMPHI
32-AsnLeuIleGlyValLeuSerAsnAla-40
42-GluAlaLeuAlaPheTyrGlnGluValGlyLysLeuAsnAlaAlaAsnSerLeuThr-60
86-LysLeuAlaThrLeuLysLys-92
100-LysAlaAlaArgAlaLeuAlaAlaGlyGlu-109
115-LeuGlyAlaLeuAlaAlaPheThrGln-123
135-GluGluLeuLysAlaPhePheAspAla-143
157-ValAlaLeuAlaThrLeuCysAsnTyrValAsnAsnLeuGly-170

Antigenic Index - Jameson-Wolf
10-GluThrAlaProGluAlaAlaLysAlaArgValGluAla-22
37-LeuSerAsnAlaPro-41
72-AlaArgThrAsnGlnCysGly-78
97-GlnSerValLysAlaAlaArg-103
108-GlyGluPheAspAspAlaLysLeu-115
126-MetAlaLysLysGlyAlaValSerAspGluGluLeuLysAla-139
170-GlyGlnThrGluIleAsnProGluLeu-178

Hydrophilic Regions - Hopp-Woods
11-ThrAlaProGluAlaAlaLysAlaArgValGluAla-22
97-GlnSerValLysAlaAlaArg-103
108-GlyGluPheAspAspAlaLysLeu-115
126-MetAlaLysLysGlyAlaValSerAspGluGluLeuLysAla-139
264
AMPHI Regions - AMPHI

55-ValAlaGluPheThrGlnThrGly-62
96-IleProSerTyrValArgValThrAsnThrLys-106
124-AsnArgIleIleAspValSer-130
183-LeuAsnGlnAlaAla-187

Antigenic Index - Jameson-Wolf
27-AlaValValLysAlaGluLysLeuHisAlaSerAlaAsnArgSerTyrLysValAlaGlyLysArgTyrThrP
roLysAsnGlnVal-55
57-GluPheThrGlnThrGlyAsnAlaSerTrp-66
68-GlyGlyArgPheHisGlyArgLysThrSerGlyGlyGluArgTyrAsp-83
103-ThrAsnThrLysAsnGlyLysSerVal-111
114-ArgValAsnAspArgGlyProPheHisGlyAsnArgIleIleAspValSerLysAlaAlaAla-134
153-ValProGlyGlnSerAlaProValAlaGluAsnLysAspIlePheIle-168
170-LeuLysSerPheGlyThrGluHisGluAla-179
200-SerValGluLysArgArgTyrGluTyr-208
213-GlyProPheThrSerGlnGluArgAlaAlaGluAlaGluAlaGlnAla-228

Hydrophilic Regions - Hopp-Woods
27-AlaValValLysAlaGluLysLeuHisAlaSerAlaAsnArgSerTyrLysValAlaGlyLysArgTyrThrP
ro-51
71-PheHisGlyArgLysThrSerGlyGlyGluArgTyrAsp-83
103-ThrAsnThrLysAsnGlyLys-109
115-ValAsnAspArgGlyProPheHis-122
125-ArgIleIleAspValSerLysAlaAlaAla-134
159-ProValAlaGluAsnLysAspIlePheIle-168
171-LysSerPheGlyThrGluHisGluAla-179
200-SerValGluLysArgArgTyrGluTyr-208
216-ThrSerGlnGluArgAlaAlaGluAlaGluAlaGlnAla-228
266-2
Antigenic Index - Jameson-Wolf
30-AlaLeuLysArgLysHisPhe-36
57-LeuGluSerArgAlaGlySerValHisAspGlnGlyTrpGlu-70
93-TrpHisThrArgAsnArgGlu-99
Hydrophilic Regions - Hopp-Woods
30-AlaLeuLysArgLysHisPhe-36
59-SerArgAlaGlySerValHis-65
268-1
AMPHI Regions - AMPHI
6-AspGlyLeuHisLysPheLysHisIleCysSerAlaAla-18
22-IleLysGluProLeuAspLysVal-29
52-GlnGluAlaAlaArgValSerGluTrp-60
70-GluPheGluGlnPheTrpLysGlyLeuProGlnThrValGlnAsn-84
89-SerGlnLysThrTrpLysSerGlyMetAspLys-99
110-LysThrProAsnGlyIleLys-116

Antigenic Index - Jameson-Wolf
1-ValGlnSerArgTyrAspGly-7
21-LeuIleLysGluProLeuAspLysValLysGlnArgAsnGluGluLeuGluAlaAlaGluGluAlaAlaAla-
44
47-AlaLeuGlyArgGluGlnGluAlaAlaArgValSerGluTrpGluGluArgTyrLysLeuSerArgSerGluP
he-71
82-ValGlnAsnLysLeuGlnAlaSerGlnLysThrTrpLysSerGlyMetAspLysIleCysAlaAsnAsnAlaL
ysAlaGluGlyLysThrProAsnGlyIleLysPhe-117
119-GluLeuAlaCysLysThrAlaLysThrGluAlaArgLeuGluGluLeuHisAsnArgLysLysAlaLeuIle
AspGluMetAlaArgGluAlaAspLysLysGluLeuSerLysArgLeu-158

Hydrophilic Regions - Hopp-Woods
3-SerArgTyrAspGly-7
21-LeuIleLysGluProLeuAspLysValLysGlnArgAsnGluGluLeuGluAlaAlaGluGluAlaAlaAla-44
47-AlaLeuGlyArgGluGlnGluAlaAlaArgValSerGluTrpGluGluArgTyrLysLeuSerArgSerGluPhe-71
91-LysThrTrpLysSerGlyMetAspLysIleCys-101
104-AsnAlaLysAlaGluGlyLysThrProAsn-113
119-GluLeuAlaCysLysThrAlaLysThrGluAlaArgLeuGluGluLeuHisAsnArgLysLysAlaLeuIleAspGluMetAlaArgGluAlaAspLysLysGluLeuSerLysArgLeu-158
269-2
AMPHI Regions - AMPHI
39-AlaSerValProAla-43
54-TrpAspPheIleGlnAsnThr-60
73-PheLysThrArgAlaLeuGlyArgPheSerSerPro-84

Antigenic Index - Jameson-Wolf
30-ArgSerAlaLeuSerCysLysProCysAlaSerValProAlaSerSer-45
60-ThrAlaSerProLysValSer-66
73-PheLysThrArgAlaLeuGlyArgPheSerSer-83
90-LeuSerGluArgGlyValLysLysProLeu-99
107-GlnValAspThrSerAla-112
117-SerLeuArgSerSer-121

Hydrophilic Regions - Hopp-Woods
61-AlaSerProLysVal-65
73-PheLysThrArgAlaLeuGly-79
90-LeuSerGluArgGlyValLysLysProLeu-99
270-2
AMPHI Regions - AMPHI
41-AspLeuThrGluGlyCys-46
49-ProAspGlySerArg-53
100-GlnProSerGlyThrTrp-105

Antigenic Index - Jameson-Wolf
1-MetAsnLysAsnArgLysLeu-7
41-AspLeuThrGluGlyCysThrLeuProAspGlySerArgValArgAlaAlaAlaValSerThrLysLysProPhe-65
71-HisAlaProAlaGlyThrGlu-77
86-LysAsnMetAspMetGlyPhe-92
95-TyrMetPheGluArgGlnProSerGlyThr-104
116-ValGluGlyArgArgAspPheThrAla-124
128-IleGlySerArgThrPhe-133

Hydrophilic Regions - Hopp-Woods
1-MetAsnLysAsnArgLysLeu-7
49-ProAspGlySerArgValArgAla-56
60-SerThrLysLysProPhe-65
73-ProAlaGlyThrGlu-77
96-MetPheGluArgGlnPro-101
116-ValGluGlyArgArgAspPheThrAla-124
271-2
AMPHI Regions - AMPHI
6-MetAlaArgIleTrp-10

20-SerProCysProAla-24
29-ProLysSerProAla-33

Antigenic Index - Jameson-Wolf
2-PheSerSerArgMetAlaArg-8
25-LeuThrThrLysProLysSerProAlaLys-34
41-ArgSerAsnCysLeu-45
61-SerSerThrThrGlyAlaProThrSerArg-70
78-SerAlaSerIleAsnLysAspThrArgMetProAlaSerVal-91
102-CysCysAlaAsnThrSerLysProProSer-111

Hydrophilic Regions - Hopp-Woods
27-ThrLysProLysSerProAlaLys-34
80-SerIleAsnLysAspThrArgMet-87
105-AsnThrSerLysProPro-110
272-2
AMPHI Regions - AMPHI
44-IleThrArgIleThrAspGlu-50
70-AlaGluGluPheSerSerThrAsn-77
106-PheArgThrIleThrSer-111
165-IleIleThrIleGluAspProIleGlu-173
194-AsnTrpMetAlaAlaLeuLysAsnThrLeuArgGlnAla-206
244-AsnGlnAlaLeuAspArgIleIleAsn-252
307-GlyAsnIleHisGluIleLysGluValMetLys-317
328-AspGlnHisLeuTyrGln-333
345-AlaLeuLysAsnAlaAspSer-351

Antigenic Index - Jameson-Wolf
2-PheThrAspGluAsnMetThrAlaLysGluGluLeu-13
20-MetAsnGlnAsnLysGlySerAsp-27
38-MetLysLeuAspGlyLysIleThrArgIleThrAspGluProLeuThrAlaGluLysCysMet-58
68-LysGlnAlaGluGluPheSerSerThrAsnGlu-78
85-LeuProAspThrSerArgPheArgVal-93
109-IleThrSerLysIleProLysPheGluSerLeuAsn-120
128-ValAlaLeuLysLysArgGly-134
142-ThrGlySerGlyLysSerThrSerLeu-150
154-IleAspTyrArgAsnGluAsnSerPheGly-163
168-IleGluAspProIle-172
176-HisGluHisLysAsnCys-181
184-ThrGlnArgGluValGlyValAspThrGluAsn-194
199-LeuLysAsnThrLeuArgGlnAlaProAsp-208
214-GluIleArgAspArgGluThrMet-221
241-AsnSerThrAsnGlnAlaLeuAspArg-249
254-PheProGluGluArgArgGluGlnLeuLeu-263
278-LeuValProArgAspGlyGlyLysGlyArgValAlaAla-290
310-HisGluIleLysGluValMetLysLysSerThr-320
334-LeuTyrGluLysGlyAspIleSerLeu-342
344-GluAlaLeuLysAsnAlaAspSerAlaHisAspLeu-355
361-LeuArgSerArgArgAlaGlnSerSerSerProAspLeuGluLeu-375

Hydrophilic Regions - Hopp-Woods
2-PheThrAspGluAsnMetThrAlaLysGluGluLeu-13
20-MetAsnGlnAsnLysGlySerAsp-27
38-MetLysLeuAspGlyLysIleThrArgIleThrAspGluProLeuThrAlaGluLysCysMet-58
68-LysGlnAlaGluGluPheSerSer-75

87-AspThrSerArgPheArgVal-93
112-LysIleProLysPheGluSer-118
128-ValAlaLeuLysLysArgGly-134
143-GlySerGlyLysSerThrSer-149
155-AspTyrArgAsnGluAsnSer-161
168-IleGluAspProIle-172
176-HisGluHisLysAsn-180
184-ThrGlnArgGluValGlyValAspThr-192
201-AsnThrLeuArgGlnAlaPro-207
214-GluIleArgAspArgGluThrMet-221
245-GlnAlaLeuAspArg-249
255-ProGluGluArgArgGluGlnLeuLeu-263
278-LeuValProArgAspGlyGlyLysGlyArgValAlaAla-290
310-HisGluIleLysGluValMetLysLysSerThr-320
336-GluLysGlyAspIleSerLeu-342
344-GluAlaLeuLysAsnAlaAspSerAlaHisAspLeu-355
361-LeuArgSerArgArgAlaGlnSerSerSerProAspLeuGluLeu
274
AMPHI Regions - AMPHI
31-TyrLysAspGlyLys-35
111-GluAlaValPheLysThrLeuSerPro-119

Antigenic Index - Jameson-Wolf

25-LeuValThrAspAspTyrTyrLysAspGlyLysHisIleAsp-38
40-GlnLeuHisArgAspGluGluAlaValArgArgHisIle-52
60-ProAspMetAsnAla-64
71-GlyGluPheAspGlyLysGlnPro-78
85-HisProThrArgLysAlaAspAspGlnThrVal-95
99-ProValGlySerAlaGlnAsnGlyArgAlaGluTyr-110
117-LeuSerProThrAsnHis-122
126-ArgValGluAspAlaAlaGly-132
136-ValGluAsnLysTrpIleThrSerGlnGlyAsnAlaValAspLeuThrProMetAspLysLeuPheAsnAsn
ThrGluSerLys-163

Hydrophilic Regions - Hopp-Woods
29-AspTyrTyrLysAspGlyLysHisIleAsp-38
40-GlnLeuHisArgAspGluGluAlaValArgArgHisIle-52
72-GluPheAspGlyLysGln-77
86-ProThrArgLysAlaAspAspGlnThrVal-95
104-GlnAsnGlyArgAlaGluTyr-110
126-ArgValGluAspAlaAlaGly-132
151-ThrProMetAspLysLeuPheAsn-158
276
AMPHI Regions - AMPHI
9-MetMetArgSerAlaProSerMetValValArgArgTrpAlaThrMetMet-25
60-SerPheLysMetAlaArg-65
80-ProPheAspProMetGlyTrp-86
115-GlyArgLeuTyrArgThrPheSerAsn-123
164-ThrLysArgGlySerArgLeu-170
207-SerThrSerThrLeuArgLysLeuMetArgProSerThr-219

Antigenic Index - Jameson-Wolf
10-MetArgSerAlaProSerMetVal-17
29-PheSerIleArgArgSerSerAlaCysTrpThrArgArgSerAspSerLeuSer-46

52-SerSerAsnAsnAsnIle-57
67-MetAlaThrArgCysArgCysProProAspLysLeuLeuPro-80
82-AspProMetGlyTrpCysSerProSerGlyGluLeuSer-94
104-ArgAlaAsnArgThrSerAlaSerProAlaSerGlyArgLeuTyr-118
121-PheSerAsnArgValSerSerAsnArgAsnThrSerTrpGluThrArgAlaAsnTrpAlaArgArgGlnSer
SerLeu-146
158-LeuProAlaAspGlySerThrLysArgGlySerArgLeuThrThr-172
176-ProLeuProGluArgProThrArgAlaThrArgSerProCysLeu-190
194-LeuLysLeuSerArg-198
200-LeuMetProSerGluArgTyrSerThrSerThrLeuArgLysLeuMetArgProSerThrArgCysGlyAla
-223
229-CysSerGlyGlyValSerArgAsnAlaHisThrProSerAlaAlaArgAsn-245

Hydrophilic Regions - Hopp-Woods
29-PheSerIleArgArgSerSer-35
38-TrpThrArgArgSerAspSerLeu-45
67-MetAlaThrArgCysArgCysProProAspLys-77
90-SerGlyGluLeuSer-94
104-ArgAlaAsnArgThrSerAla-110
124-ArgValSerSerAsnArgAsnThrSerTrpGluThr-135
137-AlaAsnTrpAlaArgArgGlnSerSer-145
161-AspGlySerThrLysArgGlySerArg-169
176-ProLeuProGluArgProThrArgAlaThrArg-186
194-LeuLysLeuSerArg-198
200-LeuMetProSerGluArgTyrSer-207
210-ThrLeuArgLysLeuMetArgProSerThrArgCys-221
232-GlyValSerArgAsnAlaHis-238
277
AMPHI Regions - AMPHI
39-GlyIleAlaValPheGluValValGlyGlyLeuLeuAspPheValLeu-54
70-CysProAsnGluValValAspValPheTyrThr-80
87-AlaPheAspAlaValGlyAspPheAlaGluTyrGlyArgAlaValAspAlaAlaAspLeuLeuGluIleGlyL
ysLeuGlyTyrPheHis-116
180-AlaValGlyValValAlaValAla-187

Antigenic Index - Jameson-Wolf
2-ProArgPheGluAspLysLeuValGlyArgGlnGlyGluGlyGlyVal-17
60-ValGlyAspGlyValAlaVal-66
68-ArgPheCysProAsnGluVal-74
95-AlaGluTyrGlyArgAlaValAspAla-103
118-ValGluProAspPheProAlaGlnThrProArgAlaGluGlyGly-132
138-PheAspLysAlaAspValVal-144
156-ValGluIleGluVal-160
164-GlyGlySerGlyLeuGluGlyAspLeu-172
196-LeuAspValGlyGlyLysProArgLeuGlyAla-206
208-CysAlaGlnAlaGlyGlyGly-214
219-GlyThrAspPheHis-223
226-GlyLeuAspAspGlyAla-231
239-LeuGlnPheGluAspAspLeuLeuGluGlyLysHisGlyLeu-252

Hydrophilic Regions - Hopp-Woods
2-ProArgPheGluAspLysLeuValGlyArgGlnGlyGlu-14
95-AlaGluTyrGlyArgAlaValAspAla-103
118-ValGluProAspPhe-122
126-ThrProArgAlaGluGly-131

138-PheAspLysAlaAspValVal-144
156-ValGluIleGluVal-160
167-GlyLeuGluGlyAspLeu-172
198-ValGlyGlyLysProArgLeuGlyAla-206
226-GlyLeuAspAspGlyAla-231
239-LeuGlnPheGluAspAspLeuLeuGluGlyLysHisGlyLeu-252
278
AMPHI Regions - AMPHI
7-GlyAlaIlePheSerIleGly-13
20-IleGlyProLeuProSerIleGlyArg-28
42-ThrGlyThrSerLys-46
101-ArgThrIleProSerValThrGluIle-109
123-PheSerIleLeuAlaLeuIleLysSerLeuIleSer-134
157-LeuTyrArgGlnIleGlnAsnLeuIleThrHisPheAsnPheTyrAlaAla-173
189-GluThrLeuIleGlnHisLeuHisGlnLeuAlaAsp-200

Antigenic Index - Jameson-Wolf
25-SerIleGlyArgProAsnAlaSerThrThrArgProThrSerSerArgProThrGlyThrSerLysIleArgP
ro-49
63-SerProAsnThrThrAlaProThrGluSerArgSerArgPheIleAla-78
80-ProLysValLeuProGlyAsnSerSerIle-89
93-IleAlaSerAspLysProTrpMetArg-101
117-SerAlaPheThrAspArgPheSer-124
146-ArgHisSerArgValGlnGlyThr-153
178-PheAspPheAspArgAspPhe-184
209-ThrValAsnAspGlyArgPheAspMetValGlu-219

Hydrophilic Regions - Hopp-Woods
27-GlyArgProAsnAlaSerThrThrArgProThrSerSerArgProThrGlyThrSerLysIleArgPro-49
68-AlaProThrGluSerArgSerArgPheIleAla-78
93-IleAlaSerAspLysProTrp-99
146-ArgHisSerArgValGln-151
178-PheAspPheAspArgAspPhe-184
211-AsnAspGlyArgPheAspMetValGlu-219
279
AMPHI Regions - AMPHI
6-GlyCysLeuIleSerThr-11
13-PheArgAlaSerAla-17
47-AlaAlaAlaMetAlaArgProThrAla-55

Antigenic Index - Jameson-Wolf
28-GlnTrpGluGlyThrAspThrGlySerGlyArgAlaArgLeuAla-42
64-CysProGlyGluLeuLysLeuThr-71
88-CysSerSerSerLysProArgIle-95
101-ThrProCysGlyThrAlaAspCysIleSerSerAlaArgArgArgThrSerLeu-118

Hydrophilic Regions - Hopp-Woods
29-TrpGluGlyThrAspThrGlySerGlyArgAlaArgLeuAla-42
66-GlyGluLeuLysLeu-70
89-SerSerSerLysProArgIle-95
110-SerSerAlaArgArgArgThrSerLeu-118
280
AMPHI Regions - AMPHI
27-SerPheSerIleLeuGlyAspValAlaLys-36
64-AspIleLysLysIleArgSerAla-71

85-AspValGlnArgAlaValLys-91
97-TyrThrGluAlaThrLysGlyIleGlnProLeuLys-108
146-AlaTyrAlaGlnAsnValAlaLysAlaLeuIleLys-157
233-ValAlaAlaIleIleArgGlnIleLys-241
243-GluGlyIleLysAlaValPheThrGlu-251
254-LysAspThrArgMetValAspArgIleAlaLysGluThr-266
274-LeuTyrSerAspAlaLeuGlyAsnAlaProAlaAspThrTyrIle-288

Antigenic Index - Jameson-Wolf
38-IleGlyGlyGluArgValSer-44
51-AlaAsnGlnAspThrHis-56
61-ThrSerGlyAspIleLysLysIleArgSerAlaLys-72
82-GluAlaAlaAspValGlnArgAlaValLysGlnSerLysValSerTyrThrGluAlaThrLysGlyIleGln-105
107-LeuLysAlaGluGluGluGlyGlyHisHisHisAspHisAspHisAspHisGluGlyHisHisHisAspHis GlyGluTyrAspProHisValTrpAsnAspPro-141
155-LeuIleLysAlaAspProGluGlyLysValTyrTyr-166
176-GlnLeuLysLysLeuHisSerAspAla-184
192-ProAlaAlaLysArgLysValLeuThr-200
208-MetGlyLysArgTyrHis-213
218-AlaProGlnGlyValSerSerGluAlaGluProSerAlaLysGln-232
238-ArgGlnIleLysArgGluGlyIle-245
251-GluAsnIleLysAspThrArgMetValAspArgIleAlaLysGluThrGlyVal-268
270-ValSerGlyLysLeuTyrSer-276
282-AlaProAlaAspThr-286
291-TyrArgHisAsnIle-295

Hydrophilic Regions - Hopp-Woods
38-IleGlyGlyGluArgValSer-44
63-GlyAspIleLysLysIleArgSerAlaLys-72
82-GluAlaAlaAspValGlnArgAlaValLysGlnSerLys-94
99-GluAlaThrLysGly-103
107-LeuLysAlaGluGluGluGlyGlyHisHisHisAspHisAspHisAspHisGluGlyHisHisHisAspHis GlyGluTyrAsp-134
155-LeuIleLysAlaAspProGluGly-162
176-GlnLeuLysLysLeuHisSerAspAla-184
192-ProAlaAlaLysArgLysValLeuThr-200
222-ValSerSerGluAlaGluProSerAlaLysGln-232
238-ArgGlnIleLysArgGluGlyIle-245
251-GluAsnIleLysAspThrArgMetValAspArgIleAlaLysGluThrGlyVal-268
281-2
AMPHI Regions - AMPHI
62-AlaAlaGlyMetLeuMetAlaLeuLeuAlaGlyLeuValSerArgPhe-77
126-LeuGlnLeuIleAlaAlaValSerSerLeuThr-136
179-LeuValSerGlyPheGlnAlaLeuGlyThrLeuMetSerVal-192
205-TrpAlaLysHisMet-209
216-SerValLeuThrAlaLeuLeuCysGly-224

Antigenic Index - Jameson-Wolf
25-ArgArgMetSerLeu-29
78-ThrThrLeuLysGluAspAlaAsn-85
102-SerLysAsnGlySerSerVal-108
159-SerValGlyGlyLysGlyGly-165
236-IleProSerGlyPro-240
256-LeuGlyLysGluGlyGlyIle-262

270-HisArgHisHisThrThr-275

Hydrophilic Regions - Hopp-Woods
25-ArgArgMetSerLeu-29
78-ThrThrLeuLysGluAspAlaAsn-85
103-LysAsnGlySerSer-107
256-LeuGlyLysGluGlyGlyIle-262
270-HisArgHisHisThr-274
282
AMPHI Regions - AMPHI
10-LeuIleValAlaPheLeuValLeuIleAsnProPheSerAlaLeu-24
50-ValPheAlaValIleAlaValPheAlaLeuIleGlyGlyThrLeu-64
112-ArgProAlaArgAsn-116
176-ValSerArgLeuLeu-180
186-ThrIleLeuAsnArgIleMetGlyMet-194

Antigenic Index - Jameson-Wolf
31-ThrAsnGlyHisSerThrLysGluArgArgLysValAlaArg-44
92-AsnGlyAsnAspAsnProAlaLysGlnAsnLeuGlyAlaGlnProGluThrGlyGlnAlaArgProAlaArgA
snAlaGly-118

Hydrophilic Regions - Hopp-Woods
34-HisSerThrLysGluArgArgLysValAlaArg-44
92-AsnGlyAsnAspAsnProAlaLysGlnAsnLeu-102
104-AlaGlnProGluThrGlyGlnAlaArgProAlaArgAsn-116
283
AMPHI Regions - AMPHI
11-ThrLeuAlaSerPheLeuPro-17
32-GlyGlyAsnSerTyrSerAspValProLysGlnLeuHis-44
67-AlaAspAlaGlyLysArgThr-73

Antigenic Index - Jameson-Wolf
28-TrpLysAspGlyGlyGlyAsnSerTyrSerAspValProLysGlnLeuHisProAspGlnSerGln-49
53-LeuArgThrArgGlnThrLysProAlaValLysProAlaGlnAlaAspAlaGlyLysArgThrAspGlyAlaA
laGlnGluAsnAsnProAspThrAlaGluLysAsnArgGlnLeuGluGluGluLysLysArgIleAlaGluThrGl
uArgGlnAsnLysGluGluAsnCysArgIleSerLysMetAsnLeu-117
121-GlyAsnSerAsnAlaLysAsnLysAspAspLeuIleArgLysTyrAsnAsnAlaValAsnLysTyrCysArg
-144

Hydrophilic Regions - Hopp-Woods
35-SerTyrSerAspValProLys-41
43-LeuHisProAspGlnSerGln-49
53-LeuArgThrArgGlnThrLysProAlaValLysProAlaGlnAlaAspAlaGlyLysArgThrAspGlyAlaA
laGlnGluAsnAsnProAspThrAlaGluLysAsnArgGlnLeuGluGluGluLysLysArgIleAlaGluThrGl
uArgGlnAsnLysGluGluAsnCysArgIleSerLysMetAsnLeu-117
123-SerAsnAlaLysAsnLysAspAspLeuIleArgLysTyrAsn-136
284
AMPHI Regions - AMPHI
43-GluAlaPheAlaGlyPhePheGluThrVal-52
61-ThrPheAlaAlaArgPhe-66
125-ValAspPheAspValPhe-130
154-ValValPheArgLeuPheArgGlnValValValAsp-165
174-AspThrAlaCysGlyAsnIleGlyGly-182
186-PheAlaAlaAlaPheThrGlnIleHisGln-195
216-PheValGlnPheIleArgAsnAspPheGlyHisGly-227

277-PheArgValPheGlyGlnPheAlaArgGlnPheAla-288
307-CysPheHisAspGlyPheAspValValAspLys-317
342-LeuHisGlnValHisGlnThrAla-349
352-GlyAspAsnGlnIleAspArgPheAlaGln-361
372-AlaAspAspAlaAspGlyAla-378
405-GlnSerThrArgAlaPheAlaArgPhePheAlaAlaPheGlyGlnPheLeuGlnSer-423

Antigenic Index - Jameson-Wolf
1-MetProSerGluThrArgAsnArgPhe-9
109-PheAspGlyGlnPhe-113
132-HisPheGlyLysArgAsnArgAsnThrArgAla-142
147-GlyAlaProAspAlaVal-152
166-AsnValGlyAsnGlyArgTyrValAspThrAlaCysGlyAsnIleGlyGlyAsnGlnAsnPhe-186
220-IleArgAsnAspPheGlyHisGlyPheGlyGlyArgGluAsnHisAla-235
273-AspPheAspAspPheArg-278
286-GlnPheAlaAspArgAlaValProSerGlyGlyGluGlnGlnSer-300
303-ValAlaArgArgCysPheHisAspGlyPheAspValValAspLysAlaHis-319
347-GlnThrAlaArgArgGlyAspAsnGlnIleAspArgPheAlaGlnGlyThrGlyLeuValAlaGluArgArg
AlaAlaAspAspAlaAspGlyAlaGlu-379
398-PheAlaGlyArgGlyGlnHisGlnSerThrArgAla-409

Hydrophilic Regions - Hopp-Woods
1-MetProSerGluThrArgAsnArgPhe-9
134-GlyLysArgAsnArgAsnThrArgAla-142
229-GlyGlyArgGluAsnHisAla-235
286-GlnPheAlaAspArgAlaValProSerGlyGlyGluGlnGln-299
313-AspValValAspLysAlaHis-319
347-GlnThrAlaArgArgGlyAspAsnGlnIleAspArgPheAla-360
366-ValAlaGluArgArgAlaAlaAspAspAlaAspGlyAlaGlu-379
402-GlyGlnHisGlnSer-406
285-1
AMPHI Regions - AMPHI
15-ValCysPheLeuGly-19
34-GlnIleProSerTrp-38
50-GlyThrLeuLeuAspGlyPheAsp-57
116-SerLeuProAspSerIleAspLeuPro-124
208-HisSerThrAlaArg-212
240-HisProPheAlaGluSerLeuAspLysThrLeuGluGluValLeu-254
266-ValProSerLeuPro-270
280-AlaIleProSerPheSerAsp-286
313-GlnValLeuGlyGly-317
592-IleGlyLysAlaAlaAspIle-598
609-ProAspThrSerArg-613
671-GlyIleAsnArgGluLeuThrArgTrp-679
747-IleAlaGluLeuHisAsnPhePheLysProProPhe-758
776-AlaArgGlyTyrLeu-780
836-PheGlyGlyAsnMetAlaAsn-842
848-ArgIleThrAlaSerLeu-853
855-AspLeuGlyAlaLeu-859
868-GlnAsnIleThrGlySerLeuAsnAlaAla-877
955-GlySerIleAlaAsp-959
1008-ThrAlaGluLeu-1012
1061-ValThrGlyMetIleLys-1066
1135-SerGlyGlySerValArgGlyValGlyThrValArg-1146
1165-ThrValSerPheValGlyProLeuAsn-1173

1190-AlaGlyValGluIleLeuGlySerLeuAsn-1199
1244-LeuAlaGlyGlnIle-1248
1305-ValLysLeuIleTyrArgLeuThrArgAlaIleGlnAlaValAlaArgIleGlySer-1323

Antigenic Index - Jameson-Wolf
43-IleSerSerGlnAsnLeuLysGlyThrLeuLeuAspGlyPheAspGlyAspAsnTrpSerIleGluThrGluG
lyAlaAspLeuLysIleSerArg-74
80-LysProSerGluLeuMetArgArgSerLeuHis-90
104-LysProThrProProLysGluGluArgProProLeuSerLeuProAspSerIleAsp-122
130-AspArgPheGluThrGlyLysIleSerMetGlyLysAlaPheAspLysGlnThrValTyr-149
151-GluArgLeuAspAlaSerTyrArgTyrAspArgLysGlyHisArgLeuAspLeuLysAlaAlaAspThrPro
TrpSerSerSerGlyAlaAla-182
185-GlyLeuLysLysProPheAla-191
198-ThrLysGlyGlyLeuGluGlyLysThrIle-207
209-SerThrAlaArgLeuSerGlySerLeuLysAspValArgAla-222
224-LeuAlaIleAspGlyGlyAsnIleArgLeuSerGlyLysSer-237
244-GluSerLeuAspLysThrLeuGlu-251
268-SerLeuProAspAla-272
292-GlySerLeuAspLeuGluAsnThrLys-300
302-GlyPheAlaAspArgAsnGlyIleProVal-311
320-IleArgGlnAspGlyThrVal-326
337-GlyArgGlyGlyIleArgLeuSerGlyLysIleAspThrGluLysAspIleLeu-354
362-SerValGlyAlaGluAspValLeu-369
372-AlaPheLysGlyArgLeuAspGlySerIle-381
387-ThrAlaSerProLysIle-392
400-ThrAlaArgThrAspGlySerLeu-407
411-SerAspProAlaAsnGlyGlnArgLysLeuVal-421
430-GlyGlnGlySerLeuThr-435
442-LeuPheLysAspArgLeuLeuLysLeuAspIleArgSerArgAlaPheAspProSerArgIleAspProGln
Leu-466
480-GluLeuAlaLysGluLysPheThrGlyLys-489
508-IleValTyrGluSerArgHisLeuProArgAlaAlaVal-520
522-LeuArgLeuGlyArgAsnIleIleLysThrAspGlyGlyPheGlyLysLysGlyAspArgLeuAsn-543
548-AlaProAspLeuSerArgPheGly-555
563-AsnValArgGlyHisLeuSerGlyAspLeuAspGlyGlyIleArgThrPheGluThrAspLeuSerGlyAla
Ala-587
594-LysAlaAlaAspIleArgSer-600
605-LeuLysGlySerProAspThrSerArgProIleArgAlaAspIleLysGlySerArgLeuSerLeuSerGly
Gly-629
634-AspThrAlaAspLeuMetLeuAspGlyThrGlyVal-645
647-HisArgIleArgThr-651
656-ThrLeuAspGlyLysProPheLysPheAspLeuAspAlaSerGlyGlyIleAsnArgGluLeuThrArgTrp
LysGlySerIle-683
696-LeuGlnAsnArgMetThrLeu-702
704-AlaGlyAlaGluArgValAla-710
729-SerTrpAspLysLysThrGlyIleSerAlaLysGlyGlyAla-742
764-LeuAsnGlyAspTrp-768
772-TyrGlyArgAsnAlaArgGly-778
782-IleSerArgGlnSerGlyAspAlaValLeu-791
803-SerLeuLysThrArgPheGlnAsnAspArgIleGly-814
817-LeuAspGlyGlyAlaArgPheGlyArgIleAsnAla-828
844-ProLeuGlyGlyArgIleThr-850
882-GlyArgValGlySerProSerVal-889
893-ValAsnGlySerSerAsnTyrGlyLysIleAsnGly-904
908-ValGlyGlnSerArgSerPheAspThrAlaProLeuGlyGlyArgLeuAsn-924

941-GlnThrValLysGlySerLeu-947
956-SerIleAlaAspProHisLeuGlyGly-964
966-IleAsnGlyAspLysLeuTyrTyrArgAsnGlnThr-977
982-LeuAspAsnGlySerLeuArg-988
991-IleAlaGlyArgLysTrpVal-997
1001LeuLysPheArgHisGluGlyThrAlaGluLeuSerGly-1013
1015-ValGlyMetGluAsnSerGlyProAspValAspIle-1026
1031-AspLysTyrArgIleLeuSerArgProAsnArgArgLeuThr-1044
1047-GlyAsnThrArgLeuArgTyrSerProGlnLysGlyIle-1059
1065-IleLysThrAspGlnGlyLeuPheGlySerGlnLysSerSerMetProSerValGlyAspAspVal-1086
1091-GluValLysLysGluAlaAla-1097
1109-AspLeuAsnAspGlyIleArg-1115
1134-GlnSerGlyGlySerValArgGlyValGly-1143
1146-ArgValIleLysGlyArgTyrLysAlaTyrGlyGlnAspLeuAspIle ThrLysGlyThr-1165
1171-ProLeuAsnAspProAsnLeuAsnIleArgAlaGluArgArgLeuSerProValGly-1189
1197-SerLeuAsnSerProArgIle-1203
1207-AlaAsnGluProMetSerGluLysAspLysLeu-1217
1225-AlaGlySerGlySerSerGlyAspAsnAlaAla-1235
1246-GlyGlnIleAsnAspArgIleGlyLeu-1254
1256-AspAspLeuGlyPheThrSerLysArgSerArgAsnAlaGlnThrGlyGluLeuAsnProAlaGlu-1277
1283-GlyLysGlnLeuThrGlyLys-1289
1299-SerSerAlaGluGlnSerVal-1305
1321-IleGlySerArgSerSerGlyGlyGluLeu-1330
1335-ArgPheAspArgPheSerGlySerAspLysLysAspSerAlaGlyAsnGlyLysGlyLys-1354

Hydrophilic Regions - Hopp-Woods
56-PheAspGlyAspAsnTrpSerIleGluThrGluGlyAlaAspLeuLysIleSerArg-74
83-GluLeuMetArgArgSerLeuHis-90
105-ProThrProProLysGluGluArgProPro-114
130-AspArgPheGluThrGlyLys-136
141-LysAlaPheAspLys-145
151-GluArgLeuAspAla-155
157-TyrArgTyrAspArgLysGlyHisArgLeuAspLeuLysAlaAlaAsp-172
200-GlyGlyLeuGluGlyLysThrIle-207
215-GlySerLeuLysAspValArgAla-222
244-GluSerLeuAspLysThrLeuGlu-251
292-GlySerLeuAspLeuGluAsnThrLys-300
302-GlyPheAlaAspArgAsnGlyIlePro-310
320-IleArgGlnAspGly-324
343-LeuSerGlyLysIleAspThrGluLysAspIleLeu-354
364-GlyAlaGluAspValLeu-369
373-PheLysGlyArgLeuAspGly-379
401-AlaArgThrAspGly-405
412-AspProAlaAsnGlyGlnArgLysLeuVal-421
442-LeuPheLysAspArgLeuLeuLysLeuAspIleArgSerArgAlaPheAspProSerArgIleAspPro-46
4
480-GluLeuAlaLysGluLysPheThrGly-488
508-IleValTyrGluSerArgHisLeuPro-516
522-LeuArgLeuGlyArgAsnIleIleLysThrAspGlyGlyPheGlyLysLysGlyAspArgLeuAsn-543
570-GlyAspLeuAspGlyGlyIleArgThrPheGluThrAspLeuSerGlyAlaAla-587
594-LysAlaAlaAspIleArgSer-600
607-GlySerProAspThrSerArgProIleArgAlaAspIleLysGlySerArgLeuSerLeu-626
634-AspThrAlaAspLeuMetLeu-640
647-HisArgIleArgThr-651
657-LeuAspGlyLysProPheLysPheAspLeuAspAla-668

670-GlyGlyIleAsnArgGluLeuThrArgTrpLysGly-681
704-AlaGlyAlaGluArgValAla-710
729-SerTrpAspLysLysThrGlyIleSerAlaLysGlyGlyAla-742
783-SerArgGlnSerGly-787
806-ThrArgPheGlnAsnAspArgIle-813
819-GlyGlyAlaArgPheGlyArgIleAsnAla-828
1001-LeuLysPheArgHisGluGlyThrAlaGluLeu-1011
1015-ValGlyMetGluAsnSerGlyProAspValAspIle-1026
1031-AspLysTyrArgIleLeuSerArgProAsnArgArgLeuThr-1044
1049-ThrArgLeuArgTyrSerPro-1055
1065-IleLysThrAspGln-1069
1075-GlnLysSerSerMet-1079
1081-SerValGlyAspAsp-1085
1091-GluValLysLysGluAlaAla-1097
1109-AspLeuAsnAspGlyIleArg-1115
1146-ArgValIleLysGlyArgTyrLysAlaTyrGlyGlnAspLeuAspIleThrLys-1163
1179-IleArgAlaGluArgArgLeuSer-1186
1209-GluProMetSerGluLysAspLysLeu-1217
1225-AlaGlySerGlySerSerGlyAspAsnAlaAla-1235
1248-IleAsnAspArgIleGlyLeu-1254
1259-GlyPheThrSerLysArgSerArgAsnAlaGlnThrGlyGluLeuAsn Pro-1275
1300-SerAlaGluGlnSerVal-1305
1321-IleGlySerArgSerSerGlyGly-1328
1335-ArgPheAspArgPheSerGlySerAspLysLysAspSerAlaGlyAsnGlyLysGlyLys-1354
285
AMPHI Regions - AMPHI
69-GluIleLysAspMetVal-74
102-ProAspAsnValLysThr-107
145-ValAlaIleLeuGlyAsp-150
157-LeuAlaGluTyrTyrArgAsnAlaLeuGluAsnTrpGlnGlnProValGlySer-174
198-ProLeuAlaLysLeuGlyAsnThr-205
238-ThrGlnArgTyrProGluGlnIleValSerGlyLeuAlaArgPhe-252
326-AspTyrTyrAsnLeuPheAsnLys-333
354-IleSerGlnProArg-358
375-ThrThrGlnAsnLeu-379
428-ThrAlaSerTrpLysArgGlnLeuLeu-436
455-ThrLeuGlyThrPheLeu-460
513-GlyAlaSerSerVal-517
555-LeuSerGlyAlaValPheHisAspMetGlyAspAlaAlaAlaAsn-569
584-ArgTrpPheSerProLeu-589

Antigenic Index - Jameson-Wolf
1-MetHisAspThrArgThrMetMet-8
30-AlaAspLeuSerGluAsnLysAla-37
43-PheLysAsnLysSerProAspThrGluSerValLysLeuLysProLysPheProVal-61
64-AspThrGlnAspSerGluIleLysAspMetValGluGluHisLeu-78
83-GlnGlnGlnGluGluValLeuAspLysGluGlnThr-94
97-LeuAlaGluGluAlaProAspAsnValLysThrMetLeuArgSerLysGlyTyrPheSerSerLysValSerL
euThrGluLysAspGlyAla-127
133-ThrProGlyProArgThrLysIle-140
151-IleLeuSerAspGlyAsnLeuAlaGluTyrTyrArgAsnAlaLeuGluAsnTrpGln-169
172-ValGlySerAspPheAspGlnAspSerTrpGluAsnSerLysThrSerVal-188
192-ValThrArgLysAlaTyrPro-198
208-AlaValAsnProAspThrAlaThr-215
223-AspSerGlyArgProIleAla-229

234-GluIleThrGlyThrGlnArgTyrProGluGlnIle-245
252-PheGlnProGlyMetProTyrAspLeu-260
270-LeuGluGlnAsnGlyHisTyrSerGly-278
283-AlaAspPheAspArgLeuGlnGlyAspArgValProVal-295
298-SerValThrGluValLysArgHisLysLeuGluThrGlyIleArgLeuAspSerGluTyrGlyLeuGlyGly
-321
342-AspMetAspLysTyrGluThr-348
355-SerGlnProArgAsnTyrArgGlyAsnTyrTrp-365
368-AsnValSerTyrAsnArgSerThrThrGlnAsnLeuGluLysArgAlaPheSerGlyGly-387
390-TyrValArgAspArgAlaGlyIleAspAlaArgLeuGly-402
405-PheLeuAlaGluGlyArgLysIleProGlySerAla-416
430-SerTrpLysArgGlnLeu-435
441-HisProGluAsnGlyHisTyrLeuAspGlyLysIle-452
468-ThrSerAlaArgAlaGly-473
476-PheThrProGluAsnLysLysLeu-483
496-ValAlaArgAspAsnAlaAspValProSer-505
509-PheArgSerGlyGlyAlaSerSerValArgGlyTyrGluLeuAspSer-524
534-ValLeuProGluArgAlaLeu-540
562-AspMetGlyAspAla-566
568-AlaAsnPheLysArgMetLysLeuLysHisGlySerGlyLeu-581
598-TyrGlyHisSerAspLysLysIleArg-606

Hydrophilic Regions - Hopp-Woods
1-MetHisAspThrArgThrMetMet-8
30-AlaAspLeuSerGluAsnLysAla-37
44-LysAsnLysSerProAspThrGluSerValLysLeuLysProLysPhe-59
64-AspThrGlnAspSerGluIleLysAspMetValGluGluHisLeu-78
84-GlnGlnGluGluValLeuAspLysGluGlnThr-94
97-LeuAlaGluGluAlaProAspAsnValLysThrMetLeuArgSer-111
119-ValSerLeuThrGluLysAspGlyAla-127
134-ProGlyProArgThrLysIle-140
174-SerAspPheAspGlnAspSerTrpGluAsnSerLysThr-186
192-ValThrArgLysAlaTyrPro-198
209-ValAsnProAspThrAlaThr-215
239-GlnArgTyrProGlu-243
283-AlaAspPheAspArgLeuGlnGlyAspArgValProVal-295
298-SerValThrGluValLysArgHisLysLeuGluThrGlyIleArgLeuAspSerGluTyr-317
342-AspMetAspLysTyrGluThr-348
373-ArgSerThrThrGlnAsnLeuGluLysArgAlaPhe-384
391-ValArgAspArgAla395GlyIleAspAlaArgLeuGly-402
405-PheLeuAlaGluGlyArgLysIlePro-413
478-ProGluAsnLysLysLeu-483
496-ValAlaArgAspAsnAlaAspVal-503
518-ArgGlyTyrGluLeuAspSer-524
534-ValLeuProGluArgAlaLeu-540
562-AspMetGlyAspAla-566
568-AlaAsnPheLysArgMetLysLeuLysHis-577
600-HisSerAspLysLysIleArg-606
287
AMPHI Regions - AMPHI
29-LysSerAlaAspThrLeuSerLysProAlaAla-39
68-GlySerGlnAspMet-72
131-AlaThrAspAlaGlyGluSerSerGlnProAlaAsnGlnProAspMetAlaAsnAlaAlaAspGlyMet-15
3
164-AsnAlaGlyAsnThrAlaAlaGlnGlyAlaAsnGlnAlaGly-177

246-PheGluLysLeuSerAspAlaAspLysIleSerAsnTyrLys-259
291-ProThrSerPheAlaArgPheArgArgSerAlaArg-302
410-LysSerValAspGlyIleIleAspSer-418
437-GlyPheLysGlyThrTrpThr-443
450-ValSerGlyLysPheTyr-455

Antigenic Index - Jameson-Wolf
18-CysGlyGlyGlyGlyGlySerProAspValLysSerAlaAspThrLeuSerLysProAla-38
42-ValSerGluLysGluThrGluAlaLysGluAspAlaProGlnAlaGlySerGlnGlyGlnGlyAlaProSerA
laGlnGlySerGlnAspMet-72
74-AlaValSerGluGluAsnThrGlyAsnGlyGlyAlaValThrAlaAspAsnProLysAsnGluAspGluValA
laGlnAsnAspMetProGlnAsnAlaAlaGlyThrAspSerSerThrProAsnHisThrProAspProAsnMet-1
22
126-AsnMetGluAsnGlnAlaThrAspAlaGlyGluSerSerGlnProAlaAsnGlnProAspMetAlaAsnAla
AlaAspGlyMetGlnGlyAspAspProSerAlaGlyGlyGlnAsnAlaGlyAsnThrAlaAlaGlnGlyAlaAsnG
lnAlaGlyAsnAsnGlnAlaAlaGlySerSerAspProIleProAlaSerAsnProAlaProAlaAsnGlyGlySe
rAsnPheGlyArgValAspLeuAlaAsn-209
214-AspGlyProSerGlnAsn-219
223-ThrHisCysLysGlyAspSerCysSerGlyAsnAsnPheLeuAspGluGluValGlnLeuLysSerGluPhe
GluLysLeuSerAspAlaAspLysIleSerAsnTyrLysLysAspGlyLysAsnAspLysPhe-267
287-TyrLysProLysProThrSerPheAlaArgPheArgArgSerAlaArgSerArgArgSerLeuProAla-30
9
321-ThrLeuIleValAspGlyGluAla-328
340-AlaProGluGlyAsnTyrArgTyrLeu-348
351-GlyAlaGluLysLeuProGlyGlySerTyr-360
364-ValGlnGlyGluProAlaLysGlyGluMet-373
388-HisThrGluAsnGlyArgProTyrProThrArgGlyArgPheAlaAla-403
405-ValAspPheGlySerLysSerValAspGlyIleIleAspSerGlyAspAspLeuHisMetGlyThrGlnLys
PheLysAlaAlaIleAspGlyAsnGlyPheLysGlyThrTrpThrGluAsnGlySerGlyAspValSerGly-452
454-PheTyrGlyProAlaGlyGluGluValAlaGlyLysTyrSerTyrArgProThrAspAlaGluLysGlyGly
Phe-478
482-AlaGlyLysLysGluGlnAsp-488

Hydrophilic Regions - Hopp-Woods
22-GlyGlyGlySerProAspValLysSerAlaAspThrLeuSerLysProAla-38
42-ValSerGluLysGluThrGluAlaLysGluAspAlaProGln-55
57-GlySerGlnGlyGlnGly-62
67-GlnGlySerGlnAsp-71
74-AlaValSerGluGluAsnThrGly-81
86-ValThrAlaAspAsnProLysAsnGluAspGluValAlaGlnAsnAspMetProGln-104
107-AlaGlyThrAspSerSerThr-113
127-MetGluAsnGlnAlaThrAspAlaGlyGluSerSerGlnProAlaAsnGlnProAspMetAlaAsnAlaAla
AspGlyMetGlnGlyAspAspProSerAlaGly-161
182-AlaGlySerSerAspProIlePro-189
225-CysLysGlyAspSerCysSer-231
235-PheLeuAspGluGluValGlnLeuLysSerGluPheGluLysLeuSerAspAlaAspLysIleSerAsnTyr
LysLysAspGlyLysAsnAspLysPhe-267
295-AlaArgPheArgArgSerAlaArgSerArgArgSerLeuPro-308
322-LeuIleValAspGlyGluAla-328
351-GlyAlaGluLysLeuPro-356
364-ValGlnGlyGluProAlaLysGlyGluMet-373
390-GluAsnGlyArgProTyrProThrArgGlyArgPheAlaAla-403
405-ValAspPheGlySerLysSerValAspGlyIleIleAspSerGlyAspAspLeuHis-423
427-GlnLysPheLysAlaAlaIleAsp-434
446-GlySerGlyAspValSerGly-452

458-AlaGlyGluGluValAlaGly-464
466-TyrSerTyrArgProThrAspAlaGluLysGlyGly-477
482-AlaGlyLysLysGluGlnAsp-488
288
AMPHI Regions - AMPHI
7-ValSerArgValLeu-11
54-IleValThrLysCysAla-59
61-ArgProTyrArgThrPheSerProLeuProVal-71
97-HisSerThrLeuArg-101
150-AlaLeuPheGlnAlaGlyPheAsp-157

Antigenic Index - Jameson-Wolf
2-HisThrGlyGlnAla-6
28-AsnLeuProGluArgSerAlaGlySer-36
58-CysAlaValArgProTyrArgThrPheSerPro-68
72-LeuProLysGlnProSerAla-78
89-LeuProArgProAlaValAsnArgHisSerThrLeuArgSerProAspPheProProArgMet-109
113-IleArgGlyAspCysLeuPro-119
126-IleIleThrArgAsnThrLysMetProSerGluThrValGlnValSerAspGlyIleGlnProLys-147
155-GlyPheAspGluAlaVal-160

Hydrophilic Regions - Hopp-Woods
28-AsnLeuProGluArgSerAla-34
58-CysAlaValArgPro-62
98-SerThrLeuArgSerProAspPheProPro-107
113-IleArgGlyAspCys-117
126-IleIleThrArgAsnThrLysMetProSerGluThrValGlnVal-140
155-GlyPheAspGluAlaVal-160
292
AMPHI Regions - AMPHI
7-LysIleLeuThrProPheThrValLeuProLeu-17
40-GlyLysSerValAla-44
62-ValLeuSerValSerGlu-67
69-ProValLysGlyIleTyrGlu-75
110-GluArgAlaAlaAspLeu-115
124-ProLeuAspLysAlaIleLysGluValArgGly-134
150-PheCysLysArgLeuGluHisGluPheGluLysMetThrAspValThr-165
195-LysAlaTrpThrAspTrpMetArg-202
212-IleCysAspAsnProVal-217

Antigenic Index - Jameson-Wolf
1-MetLysThrLysLeu-5
23-ThrProValSerAsnAlaAsnAlaGluProAlaValLysAlaGluSerAlaGlyLysSerVal-43
47-LeuLysAlaArgLeuGluLysThrTyrSerAlaGlnAspLeuLys-61
66-SerGluThrProValLysGlyIle-73
85-TyrThrAspAlaGluGlyGlyTyr-92
99-IleAsnIleAspThrArgLysAsnLeuThrGluGluArgAlaAlaAspLeuAsnLys-117
124-ProLeuAspLysAlaIleLysGluValArgGlyAsnGlyLysLeuLysVal-140
142-ValPheSerAspProAspCysProPhe-150
152-LysArgLeuGluHisGluPheGluLysMetThrAsp-163
177-HisProAspAlaAlaArgLysAla-184
189-CysGlnProAspArgAlaLysAla-196
200-TrpMetArgLysGlyLysPheProVal-208
210-GlySerIleCysAspAsnProValAlaGluThrThrSerLeuGlyGlu-225
237-PheProAsnGlyArgSerGlnSerGlyTyrSerPro-248

250-ProGlnLeuGluGluIleIleArgLysAsnGln-260

Hydrophilic Regions - Hopp-Woods
1-MetLysThrLysLeu-5
28-AlaAsnAlaGluProAlaValLysAlaGluSerAlaGlyLysSerVal-43
47-LeuLysAlaArgLeuGluLysThrTyrSer-56
99-IleAsnIleAspThrArgLysAsnLeuThrGluGluArgAlaAlaAspLeuAsnLys-117
124-ProLeuAspLysAlaIleLysGluValArgGlyAsnGlyLysLeuLys-139
144-SerAspProAspCysProPhe-150
152-LysArgLeuGluHisGluPheGluLysMetThrAsp-163
179-AspAlaAlaArgLysAla-184
190-GlnProAspArgAlaLysAla-196
200-TrpMetArgLysGlyLysPhe-206
240-GlyArgSerGlnSer-244
250-ProGlnLeuGluGluIleIleArgLysAsnGln-260
294
AMPHI Regions - AMPHI
27-ArgPheProAlaAlaPheArgArgTyrSerAla-37
45-LysProAlaAspThr-49
51-TrpHisArgValArgArgPheLysSerAsnArgArgMetArgGlyGlyLysProLeuLysLysProTyrArg-74
84-ArgAlaTrpThrAlaLeuSerHisAsnIleAlaGluArgAlaArgGluSerProArgArgCysGlyLysArgTyrAlaAspIleGlyGly-113
132-TyrAlaValAlaHisIleValHisLeu-140
165-ValSerArgGluAlaArgArgGluVal-173
176-AlaMetSerTyrArg-180
206-SerIleLeuGlyGluProPheAlaThrSerPheGly-217
227-AlaPheSerValLeuAlaHisPhe-234
247-ThrValGlyTrpSerLysTyrIleHisAlaVal-257

Antigenic Index - Jameson-Wolf
20-ValValArgThrSerSerAsnArgPhe-28
32-PheArgArgTyrSerAlaPhe-38
43-PheProLysProAlaAspThrProTrpHisArgValArgArgPheLysSerAsnArgArgMetArgGlyGlyLysProLeuLysLysProTyrArgProArgGlyGlyGlyCysArgCysArgArgAla-85
93-IleAlaGluArgAlaArgGluSerProArgArgCysGlyLysArgTyrAlaAspIleGlyGlyAspSerAspThrIleArgIleArgValPheArgLeuGluHisArgMet-129
161-HisThrGlyArgValSerArgGluAlaArgArgGluValGluLysAlaMetSer-178
240-LysMetAlaArgSer-244

Hydrophilic Regions - Hopp-Woods
20-ValValArgThrSerSerAsnArg-27
50-ProTrpHisArgValArgArgPheLysSerAsnArgArgMetArgGlyGlyLysProLeuLysLysProTyrArgProArgGlyGlyGlyCysArgCysArgArgAla-85
93-IleAlaGluArgAlaArgGluSerProArgArgCysGlyLysArgTyrAlaAspIleGlyGlyAspSerAspThrIleArg-119
121-ArgValPheArgLeuGluHisArgMet-129
164-ArgValSerArgGluAlaArgArgGluValGluLysAlaMetSer-178
295
AMPHI Regions - AMPHI
79-PheArgGlnProArgArgIle-85
111-ValGlnArgPhePheArgGlnPro-118
163-ValIleArgLysIleAlaAlaLeu-170
189-HisGlnGlnArgArgIleGlyLysThr-197
240-IleCysArgGlyThrSerGly-246

263-TyrIleIleLysProLeuGluHis-270

Antigenic Index - Jameson-Wolf
4-MetAlaArgHisAspAspGlnGlnArg-12
18-LeuProArgArgGlnGln-23
36-AlaAlaAlaHisGlyAsnArgProAlaSerAspAlaPhePheLysLeuProArgGlnArgPheHisLeu-58
73-HisGlyCysArgAlaGlnPheArgGlnProArgArgIleArgLeu-87
89-LeuArgGlnThrProArgGlnArgSerGlyGlyArgThrAspGlnAlaAla-105
115-PheArgGlnProArgIleArgGlnLysGlnArgHisThrArgAlaProAla-131
136-ValGlyProAspPheGly-141
144-GlnAsnAlaGluHisArgAla-150
171-ArgIleGlyLysGlnAsnLeuArgGlyPheProProArgArgGlyHisLeuArgHisGlnGlnArgArgIle
GlyLysThrProProGlnLeuAla-202
207-GlyGlyThrArgPheSerAspArgAsnGlyValTyrProAsnArgAlaGlyAsnGlyIleArgIleArgLeu
-230
239-ProIleCysArgGlyThrSerGly-246
253-ProTyrProTyrArgArgLysGlnProGlnTyr-263
273-IleSerCysLysThrAsnAla-279
287-PheArgGlnArgAsnGlnIleSer-294

Hydrophilic Regions - Hopp-Woods
5-AlaArgHisAspAspGlnGlnArg-12
18-LeuProArgArgGlnGln-23
36-AlaAlaAlaHisGlyAsnArgProAlaSer-45
77-AlaGlnPheArgGlnProArgArgIleArgLeu-87
91-GlnThrProArgGlnArgSerGlyGlyArgThrAspGlnAlaAla-105
118-ProArgIleArgGlnLysGlnArgHisThrArg-128
146-AlaGluHisArgAla-150
171-ArgIleGlyLysGlnAsnLeu-177
180-PheProProArgArgGlyHisLeuArgHisGlnGlnArgArgIleGlyLysThrProPro-199
210-ArgPheSerAspArgAsnGly-216
226-IleArgIleArgLeu-230
239-ProIleCysArgGlyThr-244
255-ProTyrArgArgLysGlnPro-261
287-PheArgGlnArgAsnGlnIle-293
297
AMPHI Regions - AMPHI
35-ArgThrGluArgVal-39
69-GlnProGlyAspSerLeuAlaAspValLeuAla-79
86-AspGluIleAlaArgIleThrGluLysTyr-95
157-LeuProThrLeuArg-161
199-LeuLysGluGlyAspAla-204
272-LeuValTyrThrArgIleSerSer-279
333-HisAlaAsnGlyValGluThrLeuTyrAlaHisLeuSerAlaPheSer-348

Antigenic Index - Jameson-Wolf
8-AlaLysHisArgLysTyrAla-14
32-SerThrGluArgThrGluArgValArgProGlnArgValGluGlnAsnLeuProProLeuSerTrpGlyGlyS
erGly-57
67-AlaValGlnProGlyAspSerLeuAla-75
78-LeuAlaArgSerGlyMetAlaArgAspGluIleAlaArgIleThrGluLysTyrGlyGlyGluAlaAspLeuA
rgHisLeuArgAlaAspGlnSerVal-110
115-GlyGlyAspGlyGlyAlaArgGluVal-123
127-ThrAspGluAspGlyGluArgAsnLeuValAlaLeuGluLysLysGlyGlyIleTrpArgArgSerAlaSer
GluAlaAspMetLysVal-156

167-ThrSerAlaArgGlySerLeuAlaArgAlaGluValProValGluIleArgGluSerLeuSer-187
194-PheSerLeuAspGlyLeuLysGluGlyAspAlaVal-205
228-GluValValLysGlyGlyThrArgHis-236
240-TyrTyrArgSerAspLysGluGlyGlyGlyGlyGlyAsnTyrTyrAspGluAspGlyLysValLeuGlnGlu
LysGlyGlyPheAsn-268
276-ArgIleSerSerProPheGlyTyr-283
295-HisThrGlyIleAspTyrAla-301
303-ProGlnGlyThrProValArgAlaSerAlaAspGly-314
318-PheLysGlyArgLysGlyGlyTyrGly-326
333-HisAlaAsnGlyValGlu-338
350-AlaGluGlyAsnValArgGlyGlyGlu-358
365-SerThrGlyArgSerThrGlyProHisLeu-374
376-TyrGluAlaArgIleAsnGlyGlnProValAsn-386
393-ProThrProGluLeuThrGlnAlaAspLysAlaAla-404
408-GlnLysGlnLysAlaAspAlaLeu-415
426-ValSerGlnSerAsp-430

Hydrophilic Regions - Hopp-Woods
8-AlaLysHisArgLysTyrAla-14
32-SerThrGluArgThrGluArgValArgProGlnArgValGluGlnAsn-47
68-ValGlnProGlyAspSerLeuAla-75
82-GlyMetAlaArgAspGluIleAlaArgIleThrGluLysTyrGlyGlyGluAlaAspLeuArgHisLeuArgA
laAspGln-108
117-AspGlyGlyAlaArgGlu-122
127-ThrAspGluAspGlyGluArgAsnLeuValAlaLeuGluLysLysGlyGlyIleTrpArgArgSerAlaSer
GluAlaAspMetLysVal-156
167-ThrSerAlaArgGlySerLeuAlaArgAlaGluValProValGluIleArgGluSerLeu-186
194-PheSerLeuAspGlyLeuLysGluGlyAspAlaVal-205
228-GluValValLysGlyGlyThrArg-235
242-ArgSerAspLysGluGlyGlyGly-249
253-TyrTyrAspGluAspGlyLysValLeuGlnGluLysGlyGlyPhe-267
306-ThrProValArgAlaSerAla-312
319-LysGlyArgLysGlyGlyTyr-325
350-AlaGluGlyAsnValArgGlyGlyGlu-358
366-ThrGlyArgSerThrGly-371
378-AlaArgIleAsnGly-382
396-GluLeuThrGlnAlaAspLysAlaAla-404
408-GlnLysGlnLysAlaAspAlaLeu-415
298
AMPHI Regions - AMPHI
6-SerLeuPheSerSerIle-11
13-MetSerAlaLeuIleAla-18
26-IleAsnAlaTyrTrpGlnGln-32
42-ProLeuAlaAlaTyr-46
62-LeuSerAspGlyIleLysAlaPhe-69
82-GlySerAlaAspMetProSerGlu-89
126-LeuMetGlnGlyValAla-131
134-ValGlnLysSerLeuLys-139
157-SerTyrProSerPhePheAspTrpProLysThrIleGluGluThrLeuGlnLysHisProGluIleSer-17
9
188-AsnAspProTrpAspPhe-193
208-AlaGlnGluTyrLeuLysArgValAspArgIleLeuGlu-220
245-GlnMetArgTyrLeuAspLysLeuLeuSerGluHisLeu-257
276-ArgTyrThrAspSer-280
308-AlaLysIleMetGluLys-313

Antigenic Index - Jameson-Wolf
22-SerGlnAsnProIleAsnAlaTyr-29
34-TyrHisArgAsnSerProLeuGluPro-42
47-GlyTrpTrpArgSerGlyAlaAlaLeuGlnGlu-57
70-LeuSerGlyGluThrProProThrAlaGlnAspGlyGlySerAlaAspMetProSerGluAlaAlaAla-92
94-GluAlaValProGlnThrGlyGluThrGluTrpLysGlnAspThrGluAlaAlaAlaValArgSerGlyAspL
ysValPhe-120
136-LysSerLeuLysGlnGlnTyrGlyIleGluSerValAsnLeuSerLysGlnSerThrGly-155
162-PheAspTrpProLysThrIleGluGluThrLeuGlnLysHisProGlu-177
186-GlyProAsnAspProTrpAspPheProVal-195
203-AlaSerAspGluTrpAla-208
211-TyrLeuLysArgValAspArgIleLeuGlu-220
236-TyrMetLysLysAlaLysLeuAspGlyGlnMetArgTyrLeuAsp-250
252-LeuLeuSerGluHisLeuLysGly-259
270-LeuSerGlyGlyLysAspArgTyrThrAspSerValAsnValAsnGlyLysProValArgTyrArgSerLys
AspGlyIle-296
318-ProSerThrGlnProSerSerThrGlnPro-327

Hydrophilic Regions - Hopp-Woods
73-GluThrProProThrAlaGlnAspGlyGlySerAlaAspMetProSerGluAlaAlaAla-92
94-GluAlaValProGlnThrGlyGluThrGluTrpLysGlnAspThrGluAlaAlaAlaValArgSerGlyAsp-
117
148-AsnLeuSerLysGlnSerThr-154
165-LysThrIleGluGluThrLeuGlnLysHisProGlu-177
211-TyrLeuLysArgValAspArgIleLeuGlu-220
236-TyrMetLysLysAlaLysLeuAspGlyGlnMetArgTyrLeuAsp-250
252-LeuLeuSerGluHisLeuLysGly-259
271-SerGlyGlyLysAspArgTyrThrAsp-279
281-ValAsnValAsnGlyLysProValArgTyrArgSerLysAspGlyIle-296
319-SerThrGlnProSerSerThrGlnPro-327
299
AMPHI Regions - AMPHI
54-AlaSerProTrpMetLysLysLeuGlnSerValAlaGlnGlySer-68
71-ThrPheArgIleLeuGlnIleGly-78
85-AspPhePheThrAspSerLeuArgLysArgLeuGlnLysThrTrpGly-100
238-GlnLeuThrGlnTrpSerLysTrp-245
247-AlaAspArgMetAsnAspLeuAlaGlnThr-256
281-GluGlnLysTrpLeuAspThrValArgGlnIleArgAspSerLeu-295
307-GluSerLeuLysAsnThrLeu-313
322-ArgLeuThrGluValGlnGlnMetGlnArgArgValAlaArgGln-336
344-TrpGlnAsnAlaMetGly-349
374-GlyTyrArgArgAlaAlaGluMetLeuAlaAspSerLeuGluGluLeuValArgSerAlaAlaIleArg-39
6

Antigenic Index - Jameson-Wolf
1-MetAsnProLysHis-5
35-ProSerAlaProTyrThrAspThrAsnGlyLeu-45
48-AspTyrGlyAsnAlaSerAlaSerProTrpMetLysLysLeuGln-62
65-AlaGlnGlySerGlyGluThr-71
78-GlyAspSerHisThrAlaGlyAspPhePheThrAspSerLeuArgLysArgLeuGlnLysThrTrpGlyAspG
lyGly-103
110-AlaAsnValLysGlyGlnArg-116
121-ArgHisAsnGlyAsnTrpGlnSerLeuThrSerArgAsnAsnThrGlyAspPheProLeu-140
157-AlaSerAspGlyIleAlaSerLysGlnArgVal-167

184-GlyAsnThrValSerAlaAsnGlyGlyGly-193
221-GluAsnProAlaGlyGly-226
241-GlnTrpSerLysTrpArgAlaAspArgMetAsnAspLeuAlaGlnThrGlyAla-258
266-GlyThrAsnGluAlaPheAsnAsnAsnIleAspIleAlaAspThrGluGlnLysTrp-284
286-AspThrValArgGlnIleArgAspSerLeuPro-296
305-AlaProGluSerLeuLysAsnThr-312
319-ArgProValArgLeuThrGluValGlnGlnMetGlnArgArgValAlaArgGlnGlyGlnThr-339
361-GlyTrpAlaAlaLysAspGlyVal-368
370-PheSerAlaLysGlyTyrArgArgAlaAlaGluMetLeuAlaAspSerLeuGluGluLeuValArg-391
393-AlaAlaIleArgGln-397

Hydrophilic Regions - Hopp-Woods
67-GlySerGlyGluThr-71
90-SerLeuArgLysArgLeuGlnLysThrTrpGly-100
112-ValLysGlyGlnArg-116
130-ThrSerArgAsnAsnThrGly-136
159-AspGlyIleAlaSerLysGlnArgVal-167
245-TrpArgAlaAspArgMetAsnAsp-252
276-AspIleAlaAspThrGluGlnLysTrp-284
288-ValArgGlnIleArgAspSerLeuPro-296
319-ArgProValArgLeuThrGlu-325
327-GlnGlnMetGlnArgArgValAlaArgGlnGly-337
363-AlaAlaLysAspGlyVal-368
373-LysGlyTyrArgArgAlaAlaGluMetLeuAlaAspSerLeuGluGluLeuValArg-391
393-AlaAlaIleArgGln-397

302-2
AMPHI Regions - AMPHI
20-AspGlyArgPheLeuArgThrValGluTrpLeuGlyAsnMetLeuProHisPro-37
85-LeuAsnAlaAspGlyPheIleLysIleLeuThrHisThrValLysAsnPheThrGlyPheAlaProLeuGlyT
hrValLeuValSerLeu-114
127-SerAlaLeuMetArg-131
176-GlyArgHisProLeuAlaGlyLeuAlaAlaAlaPheAlaGlyValSerGly-192
201-GlyThrIleAspProLeuLeuAlaGlyIleThrGlnGlnAla-214
239-ValIleAlaLeuIleGly-244
271-ArgHisSerAsnGluIle-276
294-LeuSerAlaLeuLeuAlaTrp-300
308-IleLeuArgHisProGluThrGly-315
341-TyrGlyArgValThrArgSerLeuArgGlyGluGlnGluValValAsnAlaMetAlaGluSerMetSer-36
3
378-PheValAlaPheAsnTrpThrAsnIleGlyGlnTyrIle-391
448-AlaProGluValIleGlnAlaAlaTyrArgIleGlyAspSerValThrAsnIleIleThrProMetMetSer
TyrPheGlyLeuIleMetAla-478
505-IleAlaTrpIleAlaLeuPheCysIle-513

Antigenic Index - Jameson-Wolf
8-LysGluLysGlnMetSerGlnThrAspThrGlnArgAspGlyArgPhe-23
61-SerValProAspProArgProValGlyAlaLysGlyArgAlaAspAspGlyLeu-78
119-IleAlaGluLysSerGly-124
134-LeuThrLysSerProArgLysLeuThr-142
152-LeuSerAsnThrAlaSerGlu-158
175-LeuGlyArgHisProLeu-180
250-LysIleValGluProGlnLeuGlyProTyrGlnSerAspLeuSerGlnGluGluLysAspIleArgHisSer
AsnGluIleThrProLeuGluTyrLys-282
304-ProAlaAspGlyIleLeuArgHisProGluThrGlyLeuValSer-318

343-ArgValThrArgSerLeuArgGlyGluGlnGluVal-354
402-ValGlyLeuGlyGly-406
482-LysTyrLysLysAspAlaGlyVal-489

Hydrophilic Regions - Hopp-Woods
8-LysGluLysGlnMetSerGlnThrAspThrGlnArgAspGlyArgPhe-23
63-ProAspProArgProValGlyAlaLysGlyArgAlaAspAsp-76
119-IleAlaGluLysSerGly-124
136-LysSerProArgLysLeu-141
263-LeuSerGlnGluGluLysAspIleArgHisSerAsnGlu-275
307-GlyIleLeuArgHisProGlu-313
343-ArgValThrArgSerLeuArgGlyGluGlnGluVal-354
482-LysTyrLysLysAspAlaGly-488
305-2
AMPHI Regions - AMPHI
10-LeuMetMetGlyLeuValGluGlyPheThrGluPheLeuPro-23
33-PheGlyAsnLeuIleGly-38
66-PheSerAsnValLeuHis-71
93-AlaAlaValMetGly-97
99-LeuPheGlyLysGlnIleLysGluTyrLeuPhe-109
141-AspValAspAlaLeuArgProIleAspAla-150
155-ValAlaGlnValPheAla-160
202-AlaTyrAspValLeuLysHisTyrArgPhePheThrLeuHis-215
222-IleGlyPheIleAlaAlaPheValSer-230
235-ValLysAlaLeuLeuArg-240

Antigenic Index - Jameson-Wolf
41-SerAsnHisLysValPhe-469
61-GluTyrArgGlnArgPheSerAsn-68
72-GlyLeuGlyLysAspArgLysAlaAsn-80
128-ValGluLysArgGlnSerArgAlaGluProLysIleAlaAsp-141
143-AspAlaLeuArgProIleAsp-149
163-ProGlyThrSerArgSerGlySer-170
180-IleGluArgLysThrAlaThr-186
241-PheValSerLysLysAsnTyr-247

Hydrophilic Regions - Hopp-Woods
62-TyrArgGlnArgPhe-66
73-LeuGlyLysAspArgLysAlaAsn-80
128-ValGluLysArgGlnSerArgAlaGluProLysIleAlaAsp-141
143-AspAlaLeuArgProIleAsp-149
165-ThrSerArgSerGlySer-170
180-IleGluArgLysThrAlaThr-186
242-ValSerLysLysAsn-246
308-1
AMPHI Regions - AMPHI
6-PheTyrArgIleLeuGlyValAla-13
15-AsnLeuTyrProArgLeu-20
27-ThrIleIleAlaGlyLeu-32
64-AlaLeuGluLeuLeuArgAlaGln-71
83-AlaGluMetAlaArgAlaSerGlu-90
101-LeuAlaAspPheValHisProIleGlyAsnIleGlyAlaCys-114
131-SerMetArgThrLeuAlaSerValAlaHisGlyPheGlyAsp-144
172-LeuAlaHisLeuAspAsnMetLysArgValThrGlu-183

Antigenic Index - Jameson-Wolf
16-LeuTyrProArgLeuSerAspPheCys-24

39-TrpGluArgArgMetMetVal-45
68-LeuArgAlaGlnAspValGluThr-75
80-SerLysGlyAlaGluMetAlaArgAlaSerGluThrAlaTyrAlaArgAspGluVal-98
118-GlyThrPheLysThrAspGlyMet-125
141-GlyPheGlyAspAsnLeuLeu-147
149-ArgAlaAlaAspValValLeuLysGluArgArgArgLeu-161
166-ArgGluThrProLeu-170
176-AspAsnMetLysArgValThrGluMetGly-185
195-MetTyrArgLysProGlnThrAlaAspAspIleVal-206
219-IleAspThrProAspSerAlaGlu-226

Hydrophilic Regions - Hopp-Woods
39-TrpGluArgArgMetMetVal-45
68-LeuArgAlaGlnAspValGluThr-75
81-LysGlyAlaGluMetAlaArgAlaSerGlu-90
92-AlaTyrAlaArgAspGluVal-98
120-PheLysThrAspGly-124
149-ArgAlaAlaAspValValLeuLysGluArgArgArgLeu-161
176-AspAsnMetLysArgValThrGlu-183
195-MetTyrArgLysProGlnThrAlaAspAspIleVal-206
220-AspThrProAspSerAlaGlu-226
311-1
AMPHI Regions - AMPHI
7-SerHisTrpArgValLeuAlaGluLeuAlaAspGlyLeuProGlnHisValSerGlnLeuAlaArgMetAlaAsp-31
37-LeuAsnGlyPheTrpGlnGlnMetProAlaHisIleArgGlyLeuLeuArg-53
55-HisAspGlyTyrTrpArgLeuValArgProLeuAlaValPheAspAlaGluGlyLeuArgGluLeuGly-77
124-ArgGlnGlyArgLysTrpSerHisArgLeu-133
165-ArgAlaLeuSerArg-169
219-ValGluAsnAlaAlaSerValGlnSerLeuPheGln-230
291-PheGluGlyThrValLysGlyValAspGlyGlnGlyVal-303
362-ThrValGlySerAlaProTyrArgAspLeuSerProLeu-374
391-CysAlaValCysGlyGluPheLysLys-399
426-TyrArgHisProGluGluHisGlySerAspArgTrpPheAsnAlaLeuGlySer-443
493-AsnLeuAsnArgHisAla-498
511-AlaValAlaSerGlyMetMetAspAlaValCys-521
550-AlaAlaLysValAlaGluAlaLeuProPro-559
576-TyrGlyLeuLeuAsnMet-581

Antigenic Index - Jameson-Wolf
28-ArgMetAlaAspMetLysProGlnGln-36
50-GlyLeuLeuArgGlnHisAspGlyTyr-58
71-GluGlyLeuArgGluLeuGlyGluArgSerGlyPhe-82
86-LeuLysHisGluCysAlaSerSerAsnAspGluIleLeuGlu-99
102-ArgIleAlaProAspLysAlaHisLys-110
116-HisLeuGlnSerLysGlyArgGlyArgGlnGlyArgLysTrpSerHisArgLeuGlyGlu-135
145-PheAspArgProGlnTyrGluLeuGlySer-154
162-AlaCysArgArgAlaLeuSer-168
182-LeuValValGlyArgAspLysLeuGly-190
196-ThrValArgThrGlyGlyLysThrVal-204
215-LeuProLysGluValGluAsn-221
231-ThrAlaSerArgArgGlyAsnAlaAsp-239

258-TyrAlaArgAspGlyPheAla-264
272-AlaAlaAsnArgAspHisGlyLys-279
284-LeuArgAspGlyGluThrValPhe-291
293-GlyThrValLysGlyValAspGlyGlnGly-302
307-GluThrAlaGluGlyLysGlnThrValValSerGlyGluIleSerLeuArgSerAspAspArgProValSer
ValProLysArgArgAspSerGluArg-339
344-AspGlyGlyAsnSerArgLeu-350
364-GlySerAlaProTyrArgAspLeuSerProLeuGly-375
378-TrpAlaGluLysAlaAspGlyAsnValArgIle-388
385-GlyGluPheLysLysAlaGlnValGln-403
405-GlnLeuAlaArgLysIleGlu-411
424-AsnHisTyrArgHisProGluGluHisGlySerAspArgTrp-437
440-AlaLeuGlySerArgArgPheSerArgAsnAla-450
464-AlaLeuThrAspAspGlyHisTyrLeuGly-473
483-MetLysGluSerLeuAla-488
492-AlaAsnLeuAsnArgHisAlaGlyLysArgTyrPro-503
529-GlyArgLeuLysGluLysThrGlyAlaGlyLysProVal-541
547-GlyGlyGlyAlaAlaLysValAlaGlu-555
565-AsnThrValArgValAlaAsp-571
584-AlaGluGlyArgGluTyrGluHis-591

Hydrophilic Regions - Hopp-Woods
28-ArgMetAlaAspMetLysProGlnGln-36
50-GlyLeuLeuArgGlnHis-55
71-GluGlyLeuArgGluLeuGlyGluArgSerGlyPhe-82
86-LeuLysHisGluCysAlaSerSerAsnAspGluIleLeuGlu-99
102-ArgIleAlaProAspLysAlaHisLys-110
118-GlnSerLysGlyArgGlyArgGlnGlyArgLysTrpSerHisArgLeuGlyGlu-135
162-AlaCysArgArgAlaLeuSer-168
183-ValValGlyArgAspLysLeuGly-190
196-ThrValArgThrGlyGlyLys-202
217-LysGluValGluAsn-221
232-AlaSerArgArgGlyAsnAlaAsp-239
259-AlaArgAspGlyPhe-263
272-AlaAlaAsnArgAspHisGlyLys-279
285-ArgAspGlyGluThrValPhe-291
293-GlyThrValLysGlyValAspGly-300
307-GluThrAlaGluGlyLysGlnThrValVal-316
320-IleSerLeuArgSerAspAspArgProValSerValProLysArgArgAspSerGluArg-339
346-GlyAsnSerArgLeu-350
367-ProTyrArgAspLeuSer-372
378-TrpAlaGluLysAlaAspGlyAsnVal-386
395-GlyGluPheLysLysAlaGlnVal-402
405-GlnLeuAlaArgLysIleGlu-411
424-AsnHisTyrArgHisProGluGluHisGlySer-434
442-GlySerArgArgPheSerArg-448
464-AlaLeuThrAspAspGlyHis-470
483-MetLysGluSerLeuAla-488
493-AsnLeuAsnArgHisAlaGlyLysArgTyrPro-503
529-GlyArgLeuLysGluLysThrGlyAlaGlyLysProVal-541
549-GlyAlaAlaLysValAlaGlu-555
565-AsnThrValArgValAlaAsp-571
584-AlaGluGlyArgGluTyrGluHis-591
312-2
AMPHI Regions - AMPHI

6-GlyGluIleLeuGluThrValLysMetValAla-16
33-AspCysIleSerSer-37

44-GlnAsnIleTyrAsnLysIleThrThrValGlyLys-55
82-IleAlaGlnIleAlaAlaAlaThr-89
95-ValSerValAlaGlnThrLeuAspLysAlaAlaLys-106
109-GlyValSerPheIleGlyGlyPheSerAlaLeuValGln-121
133-ArgSerIleProGluAlaMetLysThr-141
167-GlyGluThrValLysArgThrAla-174
182-GlyCysAlaLysIleValValPheCys-190
230-SerAspAlaThrThrLeuThrGluValAlaGluValValLysLys-244
249-IleThrArgValGlyGluLeuIleGlyArgGluAlaSerLys-262
281-ValGlyAspSerValAlaArgIleLeuGluGluMetGly-293
309-LeuAsnAspAlaVal-313-
322-SerAlaValGlyGlyLeuSerGly-329
349-LeuThrLeuAspLysLeuGluAlaMetThrAla-359
374-ThrProAlaHisThrIleSerGlyIleIle-383
409-ValGlyAspSerValGluPheGlyGlyLeuLeuGly-420

Antigenic Index - Jameson-Wolf
4-GlnSerGlyGluIleLeuGlu-10
13-LysMetValAlaAspGlnAsnPheAspVal-22

35-IleSerSerAspIle-39
52-ThrValGlyLysAspLeuValThr-59
89-ThrHisAlaAspSer-93
100-ThrLeuAspLysAlaAlaLys-106
121-GlnLysGlyMetSerProSerAspGluValLeu-131
134-SerIleProGluAlaMetLysThrThrAsp-143
152-GlySerThrArgAla-156
161-AspAlaValLysLeuAlaGlyGluThrValLysArgThrAlaGluIleThrProGluGlyPheGly-182
192-AlaValGluAspAsnProPhe-198
204-HisGlySerGlyGluAlaAspAla-211
225-AlaAlaLeuGluAsnSerAspAla-232
237-GluValAlaGluValValLys-243
251-ArgValGlyGluLeuIleGlyArgGluAlaSerLys-262
280-AlaValGlyAspSerValAlaArgIleLeuGlu-290
311-AspAlaValLysLysGlyGlyMet-318
334-ValSerGluAspGluGlyMet-340
352-AspLysLeuGluAla-356
370-ValProGlyAspThrProAla-376
383-IleAlaAspGluAlaAla-388
392-IleAsnSerLysThrThrAla-398
405-ThrGlyLysThrValGlyAspSerValGlu-414
426-ProValLysGluGlySerCys-432
435-PheValAsnArgGlyGlyArgIle-442
447-GlnSerMetLysAsn-451

Hydrophilic Regions - Hopp-Woods
18-GlnAsnPheAspVal-22

52-ThrValGlyLysAspLeuValThr-59
100-ThrLeuAspLysAlaAlaLys-106
123-GlyMetSerProSerAspGluValLeu-131
134-SerIleProGluAlaMetLysThrThrAsp-143

161-AspAlaValLysLeuAlaGlyGluThrValLysArgThrAlaGluIleThrPro-178
192-AlaValGluAspAsnPro-197
207-GlyGluAlaAspAla-211
225-AlaAlaLeuGluAsnSerAspAla-232

237-GluValAlaGluValValLys-243

251-ArgValGlyGluLeuIleGlyArgGluAlaSerLys-262
284-SerValAlaArgIleLeuGlu-290

311-AspAlaValLysLysGlyGlyMet-318
334-ValSerGluAspGluGlyMet-340
352-AspLysLeuGluAla-356
383-IleAlaAspGluAlaAla-388
408-ThrValGlyAspSerValGlu-414
426-ProValLysGluGlySerCys-432
438-ArgGlyGlyArgIle-442
447-GlnSerMetLysAsn-451

313-2
AMPHI Regions - AMPHI
27-GlyMetAspAspProArgThrTyrGlySerGly-37
41-AlaThrAsnValLeu-45
60-AspAlaAlaLysGly-64
66-ValAlaValLeuLeuAlaArgValLeuGlnGluPro-77
88-ValAlaLeuAlaAlaLeuValGlyHisMetTrpPro-99
143-SerLeuAlaAlaLeuThrAlaThrIleAlaAlaProVal-155

Antigenic Index - Jameson-Wolf
26-TyrGlyMetAspAspProArgThrTyrGlySerGlyAsnProGlyAla-41
46-ArgSerGlyLysLysLysAlaAla-53
73-ValLeuGlnGluProLeuGlyLeuSerAspSerAla-84
104-PheLysGlyGlyLysGlyVal-110
181-HisLysSerAsnIle-185
189-LeuGluGlyArgGluSerLysIleGlyGlySerArg-200

Hydrophilic Regions - Hopp-Woods
26-TyrGlyMetAspAspProArgThrTyrGly-35
46-ArgSerGlyLysLysLysAlaAla-53
105-LysGlyGlyLysGlyVal-110
181-HisLysSerAsnIle-185
189-LeuGluGlyArgGluSerLysIleGlyGlySerArg-200

401
AMPHI Regions - AMPHI
46-ValLysProTyrAsnAlaLeu-52
65-CysTyrAsnCysHisSerGlnMetIleArgProPheArg-77
112-ValGlyGlyArgTyrSerAspGluTrpHisArgIle-123
157-MetLysAlaLeuArgLysValGlyThr-165
172-IleAlaLysAlaProGluAlaLeu-179

Antigenic Index - Jameson-Wolf
5-GlnLeuAlaGluGluLysIle-11
38-AlaAlaThrGlnProAlaProGlyValLysProTyrAsn-50
55-AlaGlyArgAspIleTyrIleArgGluGlyCysTyrAsnCysHis-69

74-ArgProPheArgAlaGluThrGluArgTyrGlyHis-85
90-GlyGluSerValTyr-94
98-PheGlnTrpGlySerLysArgThrGlyProAspLeuAlaArgValGlyGlyArgTyrSerAspGluTrpHis-121
125-LeuLeuAsnProArgAspValValProGluSerAsnMetPro-138
146-AsnLysValAspValAspAla-152
158-LysAlaLeuArgLysValGlyThrProTyrSerAspGluGluIleAlaLysAlaProGlu-177
179-LeuAlaAsnLysSerGluLeuAspAla-187

Hydrophilic Regions - Hopp-Woods
5-GlnLeuAlaGluGluLysIle-11
76-PheArgAlaGluThrGluArgTyrGly-84
101-GlySerLysArgThrGlyProAspLeuAlaArgValGlyGlyArgTyrSerAspGluTrpHis-121
127-AsnProArgAspValValPro-133
146-AsnLysValAspValAspAla-152
158-LysAlaLeuArgLysValGly-164
167-TyrSerAspGluGluIleAlaLysAlaProGlu-177
179-LeuAlaAsnLysSerGluLeuAspAla-187
402-2
AMPHI Regions - AMPHI
18-PheLeuSerGlyLeu-22
85-AlaGlyIleAlaAspPhe-90
100-ThrGlyPheSerGlyPheValHis-107
117-AlaValValArgGlyLeu-122
136-LysSerGlyArgGln-140
146-PheAlaAsnValAlaGly-151
218-ValPheGlnAsnIleAlaAspArgProAspArgLeuIle-230
261-AspValPheAsnSerValAsnGlyIleGlu-270
279-LysSerGlyIleArg-283
294-SerTrpAlaArgValLeuSerAlaIleProGluMetGln-306
344-ArgLysTrpLeuArgArgHisPro-351
376-AlaGluPheLeuLysGlnValGlnSerHisLeu-386
398-HisSerProHisAlaPheAlaThrAlaValHisSerIlePro-411
437-GlnArgLeuSerArgLeu-442
460-AlaAlaGlnLysVal-464

Antigenic Index - Jameson-Wolf
4-ValAsnThrLysProAsnThrSer-11
66-ArgIleCysArgSerArgPheValAsp-74
130-ValGlyThrAspGlyAsnLysSerGlyArgGlnValSer-142
222-IleAlaAspArgProAspArgLeuIleGluAsnLysHisGly-235
240-TyrHisArgAspGlyAspLysValVal-248
264-AsnSerValAsnGlyIleGluArg-271
277-SerLeuLysSerGlyIleArgArg-284
321-IleAlaAspGluProGln-326
331-LeuGlnAspLysArgValGluIleValLeuAspAspGlyArgLysTrpLeuArgArgHisProAspGluLysPheAsp-356
385-HisLeuThrProAspGly-390
429-PheProAsnLysGluLeuLeuLysGlnArgLeuSer-440
444-TrpProGluSerGlyArgHisValPheAspSerSerThrVal-457
472-MetThrGluProSerAlaGly-478
481-ValIleThrAspAspAsnMet-487
489-ValGluTyrLysTyrGlyArgGlyIle-497

Hydrophilic Regions - Hopp-Woods

131-GlyThrAspGlyAsnLysSerGlyArgGlnVal-141
222-IleAlaAspArgProAspArgLeuIleGluAsnLysHis-234
241-HisArgAspGlyAspLysValVal-248
278-LeuLysSerGlyIleArg-283
321-IleAlaAspGluProGln-326
331-LeuGlnAspLysArgValGluIleValLeuAspAspGlyArgLysTrpLeuArgArgHisProAspGluLys
PheAsp-356
430-ProAsnLysGluLeuLeuLysGlnArgLeuSer-440
446-GluSerGlyArgHisValPhe-452
473-ThrGluProSerAlaGly-478
481-ValIleThrAspAspAsnMet-487

501-2
AMPHI Regions - AMPHI
63-ValGluValLeuGlnGluLeuPheArgGlnTyrArgValAlaArgGlnLeu-79
88-ValPheAlaAlaPheGlnAlaVal-95
97-PheGlnGlyPheAspAsnGlyPhe-104
126-AlaAspAlaPheGlnGly-131
139-ValPheGluValValGlyAspIleThrArgArgThrThrGluAla-153
183-AspGlyPheThrArgIleAsnArgCysGlyGlnCys-194
196-HisAlaPheGlyAspPheIleAsp-203

Antigenic Index - Jameson-Wolf
6-LeuThrAlaAspAla-10
17-AlaAlaGlyGlyAspGlyLysValGlnHisHisPheAspGlyArgValAlaPhe-34
46-ValGluThrGluGlyGln-51
56-ValArgAlaAspGlyGluAlaValGluVal-65
100-PheAspAsnGlyPhe-104
108-GlnSerAlaAspGluArgAsnHisAspPheAsnValGlyGln-121
144-GlyAspIleThrArgArgThrThrGluAlaGlnHis-155
179-GlyHisThrAspAspGlyPheThrArgIleAsnArgCysGlyGlnCysArgHisAlaPhe-198
202-IleAspValGluValAspArgGlyArgValThrGlyAspThrAlaGlyAsnPhe-219

Hydrophilic Regions - Hopp-Woods
6-LeuThrAlaAspAla-10
19-GlyGlyAspGlyLysVal-24
46-ValGluThrGluGlyGln-51
56-ValArgAlaAspGlyGluAlaValGluVal-65
108-GlnSerAlaAspGluArgAsnHisAsp-116
144-GlyAspIleThrArgArgThrThrGluAlaGlnHis-155
179-GlyHisThrAspAspGlyPheThrArgIleAsnArg-190
202-IleAspValGluValAspArgGlyArgValThrGlyAspThr-215
502-1
AMPHI Regions - AMPHI
6-AsnLeuPheGlnPheLeuAlaValCys-14
26-GlyAlaValAspAlaLeuLysGlnPheAsnAsnAspAlaAspGlyIleSerGlySerPheThrGln-47
98-GlnValThrLysSerSerGlnAsp-105

Antigenic Index - Jameson-Wolf
32-LysGlnPheAsnAsnAspAlaAspGlyIleSerGlySer-44
48-ThrValGlnSerLysLysLysThrGlnThrAlaHisGlyThr-61
73-GluTyrThrLysProTyrArg-79
98-GlnValThrLysSerSerGlnAspGlnAlaIleGlyGlySerPro-112
116-LeuSerAsnLysThrAlaLeuGluSerSerTyrThrLeuLysGluAspGlySerSerAsnGly-136
142-AlaThrProLysArgAsnAsnAlaGly-150

158-PheLysGlyGlyAsn-162
167-GlnLeuLysAspSerPheGlyAsnGlnThr-176
184-AsnThrAsnProGlnLeuSerArgGlyAlaPhe-194
196-PheThrProProLysGlyValAspVal-204

Hydrophilic Regions - Hopp-Woods
34-PheAsnAsnAspAlaAspGlyIle-41
49-ValGlnSerLysLysLysThrGlnThr-57
ThrLysSerSerGlnAspGlnAlaIle-108
126-TyrThrLeuLysGluAspGlySerSerAsn-135
143-ThrProLysArgAsnAsnAla-149
167-GlnLeuLysAspSerPheGly-173
503-1
AMPHI Regions - AMPHI
96-SerSerThrSerAsnPheAlaSerAlaAlaGluMetArgSerLeu-110

Antigenic Index - Jameson-Wolf
4-SerLeuTyrArgGluAlaAsnThrTrpCys-13
32-ProAlaAsnAspAlaSerGlyArgSerSerAlaValAlaGluGluArgThrAlaThrGluMetSerAlaProP
roAla-57
69-SerAlaSerSerCysSerGlyLysGlyValSer-79
87-LeuProThrArgAlaSerSerAlaThrSerSerThrSerAsn-100
105-AlaGluMetArgSerLeuArg-111
113-LeuCysAlaArgAsnAlaArg-119

Hydrophilic Regions - Hopp-Woods
4-SerLeuTyrArgGlu-8
32-ProAlaAsnAspAlaSerGlyArgSerSerAlaValAlaGluGluArgThrAlaThrGluMetSerAla-54
73-CysSerGlyLysGlyValSer-79
89-ThrArgAlaSerSer-93
105-AlaGluMetArgSerLeuArg-111
505-2
AMPHI Regions - AMPHI
20-LeuThrAlaLeuLeuLysCysLeuSerLeuLeuProLeuSerCysLeu-35
37-ThrLeuGlyAsnArg-41
89-ProAlaPhePheArgLysProGluAspIleGluThrMetPheLysAlaValHisGlyTrpGluHisValGlnG
lnAlaLeuAsp-116
148-AlaMetTyrLysProProLysIleLysAlaIleAspLysIleMetGlnAlaGly-165
178-IleGlnGlyValLysGlnIleIleLysAlaLeuArg-189
210-GlyValTrpValAspPhePheGlyLysPro-219

Antigenic Index - Jameson-Wolf
39-GlyAsnArgLeuGly-43
50-LeuLysGluAspArgAlaArgIle-57
64-AlaGlyLeuAsnProAspProLysThrValLys-74
79-GluThrAlaLysGlyGlyLeu-85
92-PheArgLysProGluAspIleGluThr-100
114-AlaLeuAspLysHisGlu-119
131-TyrAspLeuGlyGlyArgTyrIleSer-139
150-TyrLysProProLysIleLysAlaIleAspLysIleMetGln-163
165-GlyArgValArgGlyLysGlyLysThrAlaProThrSer-177
183-GlnIleIleLysAlaLeuArgSerGlyGluAlaThr-194
199-AspHisValProSerProGlnGluGlyGlyGluGlyVal-211
243-GluArgLeuProGlyGlyGlnGly-250
258-ValGlnGlyGluLeuAsnGlyAspLysAlaHisAsp-269

293-AsnArgTyrLysMetPro-298

Hydrophilic Regions - Hopp-Woods
50-LeuLysGluAspArgAlaArgIle-57
65-GlyLeuAsnProAspProLysThrVal-73
79-GluThrAlaLysGlyGlyLeu-85
92-PheArgLysProGluAspIleGluThr-100
114-AlaLeuAspLysHisGlu-119
151-LysProProLysIleLysAlaIleAspLysIleMetGln-163
165-GlyArgValArgGlyLysGlyLysThrAlaPro-175
183-GlnIleIleLysAlaLeuArgSerGlyGlu-192
201-ValProSerProGlnGluGlyGlyGlu-209
258-ValGlnGlyGluLeuAsnGlyAspLysAlaHisAsp-269
506-2
AMPHI Regions - AMPHI
6-GluValGlyArgValAlaHisCysGlyGlyGlyVal-17
25-ArgValValHisGlnValGluGlnGlyAlaArg-35
56-PheGlnArgArgPhe-60
99-AlaThrArgThrIleAspGlyAsnLeuAlaGluValTyrAlaGlnThr-114
138-GlyAsnGluValAlaArgCys-144
180-GlnValLysArgMetIleArgTyrPhePheArgVal-191

Antigenic Index - Jameson-Wolf
13-CysGlyGlyGlyValAla-18
31-GluGlnGlyAlaArgLeu-36
54-ValAspPheGlnArgArgPheGlyGluVal-63
98-ArgAlaThrArgThrIleAspGlyAsnLeu-107
134-GlyAlaAspThrGlyAsnGluValAlaArgCysGluGly-146
176-ProAsnPheGlyGlnValLysArgMetIle-185
195-HisAspLeuAspVal-199
201-ArgProPheArgLys-205

Hydrophilic Regions - Hopp-Woods
31-GluGlnGlyAlaArgLeu-36
54-ValAspPheGlnArgArgPheGlyGlu-62
98-ArgAlaThrArgThrIleAsp-104
136-AspThrGlyAsnGluValAlaArgCysGluGly-146
180-GlnValLysArgMetIle-185
195-HisAspLeuAspVal-199
201-ArgProPheArgLys-205
513
AMPHI Regions - AMPHI
6-AsnAlaAlaAlaAlaAla-11
19-GlnGlyMetIleGlnMetLeuGlyValPheValAsp-30
48-ProTyrGlyAspLeu-52
63-ValSerGlnValGlyGlnTrp-69
107-ThrAlaValPheArgMet-112
119-TyrPheGlyAlaValAla-124
139-IleMetAlaTrpIleAsnLeuValAlaIleLeuLeuLeuSer-152

Antigenic Index - Jameson-Wolf
2-GlySerAlaProAsnAla-7
11-AlaGluValLysHisProVal-17
47-GlnProTyrGlyAspLeuSerGly-54
91-AlaTyrAlaGluSerAsnVal-97

160-ArgAspTyrThrAlaLysLeuLysMetGlyLysAspProGluPheLysLeuSerGluHisProGlyLeuLys
ArgArgIleLysSerAspValTrp-191

Hydrophilic Regions - Hopp-Woods
11-AlaGluValLysHis-15
166-LeuLysMetGlyLysAspProGluPheLysLeuSerGlu-178
180-ProGlyLeuLysArgArgIleLysSer-188
515-1
AMPHI Regions - AMPHI
8-ArgAlaAlaGlyValAlaArgGlyLeuHisThrGluPheAlaArgAlaVal-24
59-AspValArgPhePheAlaGlnValGluGluIleGlyGlnAspPhePheAlaAspAla-77
90-AlaGlyGluCysAlaAspGluValSerAspLysThr-101
122-GluSerAlaGlnSerAlaAlaGlyGlyGlyLeuThrAspGlyPheGly-137
176-CysGlyLysThrValGlyVal-182
198-GlyValPheAspAla-202
251-PheGlyGlyValAla-255
259-AspGlyGlyPheAspGlyValLeuGlnGlyPhePheGlyGluVal-273

Antigenic Index - Jameson-Wolf
24-ValThrAlaGluGluIleAlaPhe-31
38-HisGluAlaArgCysGlyGlyAsn-45
51-IleAlaAlaAlaGluArgAlaGlyAsp-59
67-GluGluIleGlyGln-71
77-AlaValAspGlnGluThr-82
84-LeuAlaValGluArgAlaAlaGlyGluCysAlaAspGluValSerAspLysThrAlaArgAsnGlyGlyIleG
luGluAspGlyValAlaAlaCysArgAspAlaAlaAlaAlaGluSerAlaGln-125
128-AlaGlyGlyGlyLeuThrAspGly-135
160-GlyGlyAsnAspAlaAlaGlyAsn-167
192-LeuHisArgArgAla-196
217-AlaAspGlyGlyPheArg-222
239-HisGlnThrGlyIleGlyLysSerGly-247
256-GlyAspValAspGlyGlyPheAspGly-264
273-ValGlySerThrGlyAla-278
284-AspValAsnGlyAsnValGln-290

Hydrophilic Regions - Hopp-Woods
24-ValThrAlaGluGluIleAlaPhe-31
38-HisGluAlaArgCysGly-43
51-IleAlaAlaAlaGluArgAlaGlyAsp-59
77-AlaValAspGlnGluThr-82
84-LeuAlaValGluArgAlaAlaGlyGluCysAlaAspGluValSerAspLysThrAlaArgAsnGlyGlyIleG
luGluAspGlyValAlaAlaCysArgAspAlaAlaAlaAlaGluSerAlaGln-125
162-AsnAspAlaAlaGly-166
192-LeuHisArgArgAla-196
242-GlyIleGlyLysSerGly-247
256-GlyAspValAspGlyGlyPhe-262
519-1
AMPHI Regions - AMPHI
15-GlyPheLysSerPhe-19
29-ValValGluArgLeuGlyArgPheHisArgAlaLeuThrAlaGly-43
105-MetAlaIleThrGlnLeuAlaGlnThrThrLeuArgSerVal-118
141-AlaLeuAspGluAlaAla-146
166-GluIleLeuArgSerMetGlnAla-173
192-LysIleGluGlnIle-196
221-SerAsnAlaGluLysIleAlaArgIleAsn-230

249-AlaIleArgGlnIleAlaAlaAla-256
273-GlnTyrValAlaAlaPheAsnAsnLeuAlaLys-283
292-AlaAsnValAlaAspIleGlySerLeuIleSerAlaGlyMetLysIleIleAspSerSerLysThrAla-31
4

Antigenic Index - Jameson-Wolf
31-GluArgLeuGlyArgPheHisArg-38
58-HisSerLeuLysGluIleProLeuAspValProSerGln-70
72-CysIleThrArgAspAsnThrGlnLeuThrVal-82
91-ThrAspProLysLeuAlaSer-97
122-MetGluLeuAspLysThrPheGluGluArgAspGluIleAsn-135
141-AlaLeuAspGluAlaAlaGly-147
154-LeuArgTyrGluIleLysAspLeuValPro-163
175-IleThrAlaGluArgGluLysArgAlaArgIleAlaGluSerGluGlyArgLysIleGluGln-195
197-AsnLeuAlaSerGlyGlnArgGluAlaGluIleGlnGlnSerGluGlyGluAlaGlnAla-216
219-AsnAlaSerAsnAlaGluLysIleAlaArgIleAsnArgAlaLysGlyGluAlaGluSerLeuArgLeu-24
1
245-AlaAsnAlaGluAlaIleArg-251
258-GlnThrGlnGlyGlyAlaAspAlaValAsn-267
281-LeuAlaLysGluSerAsnThr-287
303-AlaGlyMetLysIleIleAspSerSerLysThrAlaLys-315

Hydrophilic Regions - Hopp-Woods
31-GluArgLeuGlyArgPheHisArg-38
58-HisSerLeuLysGluIleProLeu-65
73-IleThrArgAspAsnThr-78
91-ThrAspProLysLeu-95
122-MetGluLeuAspLysThrPheGluGluArgAspGluIleAsn-135
141-AlaLeuAspGluAlaAla-146
154-LeuArgTyrGluIleLysAspLeuValPro-163
175-IleThrAlaGluArgGluLysArgAlaArgIleAlaGluSerGluGlyArgLysIleGluGln-195
200-SerGlyGlnArgGluAlaGluIleGlnGlnSerGluGlyGluAlaGlnAla-216
221-SerAsnAlaGluLysIleAlaArgIleAsnArgAlaLysGlyGluAlaGluSerLeuArgLeu-241
245-AlaAsnAlaGluAlaIleArg-251
281-LeuAlaLysGluSerAsn-286
306-LysIleIleAspSerSerLysThrAlaLys-315
520-1
AMPHI Regions - AMPHI
104-LeuThrLysAlaAlaAspGlyGlnValCysArgAlaPheSerSerLeu-119

Antigenic Index - Jameson-Wolf
20-LysProSerArgArgAlaLeu-26
47-AlaSerGlyLysIleSerLeuPro-54
84-ProProAsnAsnSerThrThrThrSerThrSerSerArgAlaThrSerSerAsnGlySerLeuThrLysAlaA
laAspGlyGlnVal-112
117-SerSerLeuLysSerHisThrAlaGluIleArgIleSerArgProLysArgArgGluIleSerSerAlaLeu
SerArgAsnThrAlaAla-146
150-ProThrValProLysProLysArgProMet-159
166-SerProCysLysProThrGluMet-173

Hydrophilic Regions - Hopp-Woods
20-LysProSerArgArgAlaLeu-26
93-ThrSerSerArgAlaThrSerSer-100
103-SerLeuThrLysAlaAlaAsp-109
120-LysSerHisThrAlaGluIleArgIleSerArgProLysArgArgGluIleSer-137

140-LeuSerArgAsnThrAla-145
151-ThrValProLysProLysArgProMet-159
168-CysLysProThrGluMet-173
521-2
AMPHI Regions - AMPHI
39-ThrLysProSerLysSerCys-45
50-LeuProProIleGly-54
65-GlnThrProGluProValSerSerProSer-74
76-GlyGlyGlnValVal-80
86-ValLysThrValSerLysProAlaLys-94
133-GlnAlaArgLeuAlaLysGlyGlyAsn-141

Antigenic Index - Jameson-Wolf
36-ValTyrThrThrLysProSerLysSerCysHisSerThrAspLeuProProIleGlyAsnTyrSerSerGluA
rgTyrIleProProGlnThrProGluProValSerSerProSerAsnGlyGlyGlnValValLysTyrLysAlaPr
oValLysThrValSerLysProAlaLysSerAsnThrProProProGlnGlnAlaProSerAsnAsnSerArgArg
SerIleLeuGluThrGluLeuSerAsnGluArgLysAlaLeuValGluAlaGlnLysMetLeuSer-132
135-ArgLeuAlaLysGlyGlyAsnIleAsn-143
152-SerAsnValLeuAspArgGlnGlnAsn-160
164-LeuGlnArgGluLeuGlyArg-170

Hydrophilic Regions - Hopp-Woods
40-LysProSerLysSerCysHis-46
57-SerSerGluArgTyrIle-62
65-GlnThrProGluProValSer-71
80-ValLysTyrLysAlaProVal-86
88-ThrValSerLysProAlaLysSerAsnThrProPro-99
102-GlnAlaProSerAsnAsnSerArgArgSerIleLeuGluThrGluLeuSerAsnGluArgLysAlaLeuVal
GluAlaGlnLysMetLeuSer-132
154-ValLeuAspArgGlnGlnAsn-160
164-LeuGlnArgGluLeuGlyArg-170
522
AMPHI Regions - AMPHI
32-TrpValIleLeuAlaLeuLeuAlaLeuThrAlaLeuLeuSer-45
57-LysIleValGluSerCysValLys-64
96-MetTrpGluGlnProLeuAspArgLeuSerGluLysGlnIleArgSerPheGlyLysLeuGlyAlaGlnGluG
lnLeuAspLeuLeuGlyGlyAla-127

Antigenic Index - Jameson-Wolf
1-MetThrGluProLysHisGluMetLeuThrLysGluGlnValAlaAlaArgLysLysAlaLysAlaLysIleAr
gThr-26
48-AlaMetSerLysProGlnAlaLysGlnLysIleValGluSerCysValLys-64
71-LysTrpGlnAsnAspLeuArgAlaArgGlyLeuAspSerAsnAsnThrArgLeuAla-89
99-GlnProLeuAspArgLeuSerGluLysGlnIleArgSerPheGlyLysLeuGlyAla-117
128-AsnAlaPheGluAlaArgAspLysGlnCysValAlaAspLeuLysSerGlu-144

Hydrophilic Regions - Hopp-Woods
1-MetThrGluProLysHisGluMetLeuThrLysGluGlnValAlaAlaArgLysLysAlaLysAlaLysIleAr
gThr-26
48-AlaMetSerLysProGlnAlaLysGlnLysIleValGluSerCysVal-63
71-LysTrpGlnAsnAspLeuArgAlaArgGlyLeuAspSerAsnAsnThr-86
100-ProLeuAspArgLeuSerGluLysGlnIleArgSerPheGly-113
130-PheGluAlaArgAspLysGlnCysValAlaAspLeuLysSerGlu-144
525-1
AMPHI Regions - AMPHI

59-GluPheAlaGluPheValAsnSerHisProGln-69
86-LysHisTrpMetLysAsnGly-92
125-ArgLeuProThrIleAspGluTrpGluPhe-134
154-ThrIleLeuAspTrpTyr-159
164-ArgLysGlyLeuHisAspValGly-171
178-TrpGlyValTyrAsp-182
188-TrpGluTrpThrGlu-192

Antigenic Index - Jameson-Wolf
24-ValGlnIleGluGlyGlySerTyrArgProLeuTyrLeuLysLysAspThrGlyLeuIleLys-44
46-LysProPheLysLeuAspLysTyrProValThr-56
67-HisProGlnTrpGlnLysGlyArgIleGlySerLysGlnAlaGlu-81
88-TrpMetLysAsnGlySerArgSerTyrAlaProLysAlaGlyGluLeuLysGlnPro-106
122-GlnGlyLysArgLeuProThrIleAspGluTrpGlu-133
140-AlaThrGlnLysAsnGlySerAsnGluProGlyTyrAsnArgThr-154
159-TyrAlaAspGlyGlyArgLysGlyLeuHisAspValGlyLysGlyArgProAsnTyr-177
190-TrpThrGluAspPheAsnSerSerLeuLeuSerSerGlyAsnAla-204
213-AlaSerIleGlySerSerAspSerSerAsnTyr-223
234-SerLeuGlnSerLysTyr-239

Hydrophilic Regions - Hopp-Woods
35-TyrLeuLysLysAspThrGlyLeuIleLys-44
46-LysProPheLysLeuAspLysTyrPro-54
71-GlnLysGlyArgIleGlySerLysGlnAlaGlu-81
91-AsnGlySerArgSerTyrAlaProLysAlaGlyGluLeuLysGln-105
122-GlnGlyLysArgLeuProThr-128
140-AlaThrGlnLysAsnGlySerAsnGluProGlyTyr-151
162-GlyGlyArgLysGlyLeuHisAspValGlyLysGlyArgPro-175
216-GlySerSerAspSerSerAsn-222
527-2
AMPHI Regions - AMPHI
7-PhePheGlnProValGln-12
28-SerAspAlaAlaGluLeuValGluLeuPheAlaLeuPhePro-41
73-GlyLysGlyIleGluArgGlnValAspAsnIleAlaAspValTyrGlyPhe-89

Antigenic Index - Jameson-Wolf
26-GlyGlySerAspAlaAlaGlu-32
52-GlnLysProArgLeuGlyCys-58
71-PheIleGlyLysGlyIleGluArgGlnValAspAsnIleAla-84
107-LeuLeuArgLysGlyThrGlyLeuGluLysThrCysArgProLysProPheValGlnProHisGlyGlyArg
-130

Hydrophilic Regions - Hopp-Woods
27-GlySerAspAlaAlaGlu-32
52-GlnLysProArgLeuGlyCys-58
75-GlyIleGluArgGlnValAspAsnIleAla-84
107-LeuLeuArgLysGlyThrGlyLeuGluLysThrCysArgProLysPro-122
528-1
AMPHI Regions - AMPHI
7-LysTyrThrAlaMetAlaAlaLeuLeuAlaPhe-17
23-ArgLeuAlaGlyTrpTyrGluCysSerSerLeuThrGlyTrpCysLysProArgLysProAlaAlaIle-45
69-AsnArgSerValArg-73
86-TyrArgLysIleGlyLysPhe-92
106-ProLeuIleGluThrPheLys-112

Antigenic Index - Jameson-Wolf
1-MetGluIleArgAla-5
29-GluCysSerSerLeuThrGlyTrpCysLysProArgLysProAlaAla-44
49-AspIleGlyGlyGluSerProProSerLeuGlyAspTyrGluIleProLeuSerAspGlyAsnArgSerValA
rgAlaAsnGluTyrGluSerAlaGlnGlnSer-83
88-LysIleGlyLysPheGluAlaCysGlyLeuAspTrpArgThrArgAspGlyLysProLeu-107
110-ThrPheLysGlnGlyGlyPheAspCysLeuGluLysGlnGlyLeuArgArgAsnGlyLeuSerGluArgVal
ArgTrp-135

Hydrophilic Regions - Hopp-Woods
1-MetGluIleArgAla-5
37-CysLysProArgLysProAlaAla-44
51-GlyGlyGluSerProProSer-57
59-GlyAspTyrGluIleProLeu-65
67-AspGlyAsnArgSerValArgAlaAsnGluTyrGluSerAlaGln-81
88-LysIleGlyLysPheGluAlaCys-95
99-TrpArgThrArgAspGlyLysProLeu-107
117-AspCysLeuGluLysGlnGlyLeuArgArgAsnGlyLeuSerGluArgValArgTrp-135
529
AMPHI Regions - AMPHI
11-LeuAlaLeuIleGlyLeuAlaAlaCysSer-20
35-SerHisArgLeuIle-39
49-AsnProAspGlnGlyAsnLeuTyrArgLeuProAla-60
79-GlnGlnProAlaAspAlaGluValLeuLysSerValLysGlyValArg-94
152-GlnAspSerLeuArgArgLeuPheAsp-160
196-AlaMetLysGluVal-200
223-AlaPheLeuThrArgPheMetGlnTyrLeu-232
252-AlaAsnGluMetAla-256
270-GlyArgAsnTrpArgArgThrVal-277

Antigenic Index - Jameson-Wolf
19-CysSerGlySerLysThrGluGlnProLysLeuAspTyrGlnSerArgSerHisArgLeuIleLys-40
42-GluValProProAspLeuAsnAsnProAspGlnGlyAsnLeuTyr-56
60-AlaGlySerGlyAlaValArgAlaSerAspLeuGluLysArgArgThrProAlaVal-78
80-GlnProAlaAspAlaGluValLeuLysSerValLysGlyValArgLeuGluArgAspGlySerGln-101
105-ValValAspGlyLysSerProAlaGlu-113
123-GlnGluAsnGlyPheAspIleLysSerGluGluProAla-135
139-MetGluThrGluTrpAlaGluAsnArgAlaLysIleProGlnAspSerLeuArgArgLeuPheAsp-160
169-SerThrGlyGluArgAspLysPheIleValArgIleGluGlnGlyLysAsnGlyValSer-188
195-LysAlaMetLysGluValTyrGlyGlyLysAspLysAspThrThr-209
212-GlnProSerProSerAspProAsnLeu-220
233-GlyValAspGlyGlnGlnAlaGluAsnAlaSerAlaLysLysProThrLeu-249
253-AsnGluMetAlaArgIleGluGlyLysSer-262
268-AspTyrGlyArgAsnTrpArgArgThrVal-277
289-GlyGlnAsnThrGluArgHisAla-296
300-GlnLysAlaProAsnGluSerAsnAlaValThrGluGlnLysProGlyLeu-316
320-LeuLeuGlyLysGlyLysAlaGluLysProAlaGluGlnProGlu-334
342-ValAlaAsnGlySerArg-347
350-LeuLeuAsnLysAspGlySerAlaTyrAlaGlyLysAspAlaSer-364
370-LeuHisSerGluLeuArg-375

Hydrophilic Regions - Hopp-Woods
20-SerGlySerLysThrGluGlnProLysLeuAspTyrGlnSerArgSerHisArgLeuIleLys-40
42-GluValProProAspLeuAsnAsnProAspGln-52
63-GlyAlaValArgAlaSerAspLeuGluLysArgArgThrProAla-77

80-GlnProAlaAspAlaGluValLeuLysSerValLysGlyValArgLeuGluArgAspGlySerGln-101
107-AspGlyLysSerProAla-112
125-AsnGlyPheAspIleLysSerGluGluProAla-135
139-MetGluThrGluTrpAlaGluAsnArgAlaLysIleProGlnAspSerLeuArgArgLeuPheAsp-160
170-ThrGlyGluArgAspLysPheIleVal-178
180-IleGluGlnGlyLysAsnGlyVal-187
195-LysAlaMetLysGluValTyrGlyGlyLysAspLysAspThrThr-209
214-SerProSerAspProAsnLeu-220
235-AspGlyGlnGlnAlaGluAsnAlaSerAlaLysLysProThr-248
253-AsnGluMetAlaArgIleGluGlyLysSer-262
269-TyrGlyArgAsnTrpArg-274
291-AsnThrGluArgHis-295
302-AlaProAsnGluSerAsnAlaValThrGluGlnLysProGlyLeu-316
320-LeuLeuGlyLysGlyLysAlaGluLysProAlaGluGlnProGlu-334
352-AsnLysAspGlySer-356
359-AlaGlyLysAspAlaSer-364
370-LeuHisSerGluLeuArg-375
531
AMPHI Regions - AMPHI
59-SerLeuAlaGlyIleLeuAlaAspTyrValAlaGlyIleTrpGlyThr-74
90-GlySerIleIleGlyIlePhePheSerLeuProGlyLeuIleLeuGly-105
108-IleGlyAlaAlaAlaGly-113
132-LeuLeuGlyLeuValVal-137

Antigenic Index - Jameson-Wolf
74-ThrLysTyrThrGlyAlaGlyLysLeuAlaVal-84
114-GluLeuIleGluArgArgAsnMet-121

Hydrophilic Regions - Hopp-Woods
114-GluLeuIleGluArgArgAsnMet-121
532
AMPHI Regions - AMPHI
6-GlyLysGlyAlaAsp-10
27-AlaLeuLeuSerAlaValThrHisLeuLeuAlaIlePheValProMetIleThr-44
76-TyrLeuGlnValAsnArgPheGlyPro-84
122-SerThrLeuLeuGly-126
147-LysValIleThrProThrVal-153
184-ThrPheGlySerMetGluAsnLeuGly-192
206-CysMetLysAsnPro-210
224-GlyTyrIleValAlaLeu-229
236-PheSerAlaLeuGlnAsnLeuPro-243
271-LeuSerValPheGluAlaValGlyAspLeuThrAla-282
297-ThrLysArgLeuArgGlyGlyVal-304
307-AspGlyLeuValSerValIleAlaThrAlaLeuGly-318
338-AlaSerArgHisValGlyLysTyr-345
361-ArgAlaPheThrThrIleProSerProVal-370

Antigenic Index - Jameson-Wolf
1-MetSerGlyGlnLeuGlyLysGlyAlaAspAlaPro-12
18-LeuGluAspArgProProPheGlyAsn-26
80-AsnArgPheGlyPro-84
108-AlaGlyMetLysGluGlyGlyLeuThrLysAspAlaMet-120
177-PheGlyAlaLysAlaAspGlyThrPheGlySer-187
207-MetLysAsnProLeuLeuArg-213
286-ValSerAspGlnProIleGluGlyGluGluTyrThrLysArgLeuArgGlyGlyValLeu-305

391-ValSerHisGlyIleArgArgArgGluAlaVal-401
445-LeuProGluAspLysThrGluAlaAlaValLysPheAspThrAspHisLeuGluHis-463

Hydrophilic Regions - Hopp-Woods
4-GlnLeuGlyLysGlyAlaAspAlaPro-12
18-LeuGluAspArgProProPhe-24
109-GlyMetLysGluGlyGlyLeuThrLysAspAlaMet-120
179-AlaLysAlaAspGly-183
289-GlnProIleGluGlyGluGluTyrThrLysArgLeuArgGly-302
394-GlyIleArgArgArgGluAlaVal-401
445-LeuProGluAspLysThrGluAlaAlaValLysPheAspThrAspHisLeuGluHis-463
537-2
AMPHI Regions - AMPHI
38-GlnIleArgAspGlyGlyAspAlaLeuHisTyrLeuAsnArgIle-52
86-HisGlyGluHisHis-90
109-GlyTyrLeuTyrAsnGlyValHisGlu-117
138-ArgGlnValAspGlyLeuMetSerAlaIleTyr-148
182-ArgPheGluArgHisCys-187
194ProGluAlaGlyArgLysTyrTyrArgAsnAla-204
281-ArgProValArgValLeuThrAlaGly-289
315-TyrThrAlaValPheAspTyrValArgAsnGlyArgArgAla-328

Antigenic Index - Jameson-Wolf
21-ThrGlnAsnGlnSerLeuProAlaGly-29
32-ValTyrProSerAlaProGlnIleArgAspGlyGlyAspAla-45
69-AsnSerAlaArgArgHisAlaSer-76
80-LeuAsnProGluAspGlyHisGlyGluHisHisProAspAsnProHis-95
99-GlnLysLeuThrGluArgThrArgLeu-107
115-ValHisGluAsnIleSerThrGluGluGluAlaAlaGluSerSerAspSerAspIleArgThrGlnGlnArg
GlnValAspGlyLeu-143
152-SerLeuLeuAspArgHisThrAspGluAlaGly-162
165-PheValArgGluAsnGlyLysThr-172
178-GlnGlyAsnGlyArgPheGluArgHisCysAlaGlnGlyArgAsnGlnProGluAlaGlyArgLysTyrTyr
ArgAsnAlaCysHisAsnGly-208
212-TyrThrAspGluAlaMetPro-218
237-PheHisGlyGluArgProAspProValProGluTyrGluIleThrGlyAsnProAlaSer-256
258-AspPheSerGluAlaAlaGly-264
266-IleThrMetLysSer-270
274-TyrGlnGlyLysAsnGluIleArgPro-282
287-ThrAlaGlyAsnAspProAsnGlyArgLeuThr-297
320-AspTyrValArgAsnGlyArgArgAlaGlnAla-330
334-PheArgThrArgLysProAspTyrProTyr-343
345-GluValAsnGlyGlyGluThrLeuAlaValArgLysGlyGluLys-359
364-TrpArgGlyArgTrpCysLeu-370
376-TyrThrTyrArgGlnArgProGlySerArgLeuSerIleGlyArgHisGluAlaGlyGly-395
401-AspGlyMetAlaGlySer-406
408-IleThrLeuAlaProGluGlyGluThrGluArgGly-419

Hydrophilic Regions - Hopp-Woods
37-ProGlnIleArgAspGlyGlyAsp-44
69-AsnSerAlaArgArgHisAla-75
81-AsnProGluAspGlyHisGlyGluHisHisProAsp-92
100-LysLeuThrGluArgThrArgLeu-107
119-IleSerThrGluGluGluAlaAlaGluSerSerAspSerAspIleArgThrGlnGlnArgGlnValAsp-14
1

152-SerLeuLeuAspArgHisThrAspGluAlaGly-162
165-PheValArgGluAsnGlyLys-171
179-GlyAsnGlyArgPheGluArgHisCysAlaGlnGlyArgAsnGlnProGluAlaGlyArgLysTyrTyrArg
-202
238-HisGlyGluArgProAspProValProGlu-247
258-AspPheSerGluAlaAlaGly-264
266-IleThrMetLysSer-270
275-GlnGlyLysAsnGluIleArgPro-282
289-GlyAsnAspProAsnGlyArg-295
323-ArgAsnGlyArgArgAlaGlnAla-330
334PheArgThrArgLysProAsp-340
352-LeuAlaValArgLysGlyGluLys-359
377-ThrTyrArgGlnArgProGlySer-384
387-SerIleGlyArgHisGluAla-393
412-ProGluGlyGluThrGluArgGly-419
538-2
AMPHI Regions - AMPHI
42-ThrAlaLeuAlaGluAlaValGluLeuValLysAlaAlaGly-55
79-LysAlaAlaGluLeuSerGluAlaValAla-88
145-GlnLeuSerHisLeuAlaGlyArgLeuIleArgGlyTyrGlyHisLeuGln-161
188-IleAsnAlaLeuLysLysGlnLeuAla-196
211-SerGlyThrIleLysThrPheAlaLeuValGlyTyrThrAsn-224
231-PheAsnArgLeuThrLys-236
271-GlyPheValSerAspLeuProHisLysLeuIleSerAlaPheSerAlaThrLeuGlu-289
307-AsnSerGlyGlnGlnIleGluAspValGluAsnValLeuGlnGluIleHis-323
365-GluAsnThrGlyIleAspAlaLeuArgGluAlaIleAlaGluSerCysAla-381

Antigenic Index - Jameson-Wolf
1-MetThrGlyArgThrGlyGlyAsnGlySerThrGlnAlaGlnProGluArg-17
24-MetLeuAspLysAspGlyThrGlySerSerAlaAlaArg-36
48-ValGluLeuValLys-52
54-AlaGlyGlyAspSerValArgValGluThrAlaLysArgAspArgProHisThr-71
77-ThrGlyLysAlaAlaGluLeuSerGlu-85
100-GluLeuThrProThrGlnGluArgAsnLeuGluLysGluLeuLysCysArgValLeuAsp-119
129-AlaArgArgAlaArgThrGlnGluGlyArgLeuGlnVal-141
161-GlnSerGlnArgGlyGlyIleGlyMetLysGlyProGlyGluThrLysLeuGluThrAspArgArgLeuIle
-184
189-AsnAlaLeuLysLysGlnLeuAlaAsnLeuLysLysGlnArgAlaLeuArgArgLysSerArgGluSerGly
ThrIleLysThr-216
224-AsnValGlyLysSerSerLeu-230
233-ArgLeuThrLysSerGlyIleTyrAla-241
257-TyrIleSerProGluCys-262
287-ThrLeuGluGluThrAlaGln-293
304-AlaAlaProAsnSerGlyGlnGlnIleGluAspValGluAsnValLeu-319
323-HisAlaGlyAspIlePro-328
333-TyrAsnLysThrAspLeuLeuProSerGluGluGlnAsnThrGlyIle-348
365-GluAsnThrGlyIleAspAlaLeuArgGluAlaIleAla-377
380-CysAlaAlaAlaProAsnThrAspGluThrGluMetPro-392

Hydrophilic Regions - Hopp-Woods
1-MetThrGlyArgThrGlyGly-7
13-AlaGlnProGluArg-17
25-LeuAspLysAspGlyThrGly-31
48-ValGluLeuValLys-52
54-AlaGlyGlyAspSerValArgValGluThrAlaLysArgAspArgProHis-70

78-GlyLysAlaAlaGluLeuSerGlu-85
101-LeuThrProThrGlnGluArgAsnLeuGluLysGluLeuLysCysArgValLeuAsp-119
129-AlaArgArgAlaArgThrGlnGluGlyArgLeuGlnVal-141
161-GlnSerGlnArgGlyGlyIle-167
171-GlyProGlyGluThrLysLeuGluThrAspArgArgLeuIle-184
189-AsnAlaLeuLysLysGlnLeuAlaAsnLeuLysLysGlnArgAlaLeuArgArgLysSerArgGluSerGly
Thr-213
287-ThrLeuGluGluThrAlaGln-293
310-GlnGlnIleGluAspValGluAsnValLeu-319
337-AspLeuLeuProSerGluGluGlnAsn-345
370-AspAlaLeuArgGluAlaIleAla-377
384-ProAsnThrAspGluThrGluMetPro-392
539-2
AMPHI Regions - AMPHI
18-ArgGlnArgGluHisHisArgLeu-25
44-LeuValGlyGlyPheAspPheLeuArgValIleGlyCysGlyGlyValAlaTyrLeuProAspPheGlnGln-
67

Antigenic Index - Jameson-Wolf
1-MetGluAspLeuGlnGluIleGly-8
15-LysValGlyArgGlnArgGluHisHisArgLeuHisHisProGlnProGlyAsnGlyGluAlaAspAsp-37
63-ProAspPheGlnGlnAsnValGlyLysAlaAsp-73
77-ValProAspAspAlaAlaAla-83
88-IleGluValAspAlaAspAspAlaValCys-97
102-LeuPheAspGlnProAspAlaGlyGlyAlaGlyAspAlaAlaGluHis-117

Hydrophilic Regions - Hopp-Woods
1-MetGluAspLeuGlnGluIleGly-8
15-LysValGlyArgGlnArgGluHisHisArg-24
31-GlyAsnGlyGluAlaAspAsp-37
69-ValGlyLysAlaAsp-73
78-ProAspAspAlaAlaAla-83
88-IleGluValAspAlaAspAspAlaValCys-97
102-LeuPheAspGlnProAspAlaGlyGlyAlaGlyAspAlaAlaGluHis-117
542-2
AMPHI Regions - AMPHI
6-ArgIleArgArgCysSerVal-12

Antigenic Index - Jameson-Wolf
1-MetProLysTrpSerArgIleArgArgCysSerVal-12
37-ValArgLeuLysSerSerAspGlyIleAlaSer-47
56-GlyProMetProSerGluThrValSerHisLysSerAspSerSerArgAsnThrSerAlaSerArgArgAsnV
alSerProLysCysProPhe-86
90-PheArgGlnAspAlaAlaLysProArgArgPheGlyGlyLys-103
107-LeuThrGlySerArg-111

Hydrophilic Regions - Hopp-Woods
5-SerArgIleArgArgCysSer-11
37-ValArgLeuLysSerSerAspGlyIleAla-46
58-MetProSerGluThrValSerHisLysSerAspSerSerArgAsnThrSerAlaSerArgArgAsnValSerP
ro-82
90-PheArgGlnAspAlaAlaLysProArgArgPheGlyGly-102
544-2
AMPHI Regions - AMPHI
11-AlaLeuIleGlyIleLeu-16

55-PheTrpPheProSerCysProGlyCysValSerGluMetProLysIleIleLysThrAla-74
85-LeuAlaValAlaGlnProIleAspProIleGluSerValArgGlnTyrVal-101
116-LysAlaValGlyGlnAlaPhe-122

Antigenic Index - Jameson-Wolf
1-MetLysLysIleLeu-5
22-IleProAspSerLysThrAlaPro-29
35-AspLeuHisGlyLysThrValSerAsnAlaAspLeuGlnGly-48
59-SerCysProGlyCys-63
66-GluMetProLysIleIleLysThrAlaAsnAspTyrLysAsnLysAsnPhe-82
90-ProIleAspProIleGluSerValArgGlnTyrValLysAspTyrGly-105
113-AspAlaAspLysAlaVal-118
133-IleGlyLysLysGlyGluIleLeu-140
144-ValGlyGluProAspPheGlyLysLeuTyrGlnGluIleAspThrAlaTrpArgAsnSerAspAlaVal-16
6

Hydrophilic Regions - Hopp-Woods
1-MetLysLysIleLeu-5
23-ProAspSerLysThr-27
66-GluMetProLysIleIleLysThrAlaAsnAspTyrLysAsnLysAsn-81
92-AspProIleGluSerValArgGlnTyrValLys-102
113-AspAlaAspLysAlaVal-118
133-IleGlyLysLysGlyGluIle-139
156-IleAspThrAlaTrpArgAsnSerAspAlaVal-166
547-2
AMPHI Regions - AMPHI
7-PheAsnLysThrValAlaSerPheAlaGlnIleValGluThrPheAspVal-23
62-AsnArgSerPheLys-66
105-LeuHisIlePheThrAsnIle-111
121-GluLeuLeuThrIleLeuValLys-128

Antigenic Index - Jameson-Wolf
3-ValAspAsnGlyPheAsnLysThrVal-11
35-GlnMetLysGlnArgCysGly-41
53-PheProArgCysGlyPheGluIleProAsnArgSerPheLysGlu-67
76-LeuSerGluArgPheArgThrAsnAlaGluValGluMet-88
129-AsnLeuSerProAsnGlyLysLysArgPhe-138

Hydrophilic Regions - Hopp-Woods
36-MetLysGlnArgCys-40
60-IleProAsnArgSerPheLysGlu-67
76-LeuSerGluArgPheArgThrAsnAlaGluValGluMet-88
130-LeuSerProAsnGlyLysLysArgPhe-138
548-2 (from 23)
AMPHI Regions - AMPHI
14-ValLeuAlaAlaLeuAlaAlaCysLys-22
39-SerAlaAlaGluAsnAlaAlaLysPro-47
89-PheThrHisCysProAspValCysProThr-98
103-TyrSerAspThrLeuLysGlnLeuGlyGlyGln-113
132-GluIleIleGlyLysTyrAlaLys-139
Antigenic Index - Jameson-Wolf
21-CysLysProGlnAspAsnSerAlaAla-29
39-SerAlaAlaGluAsnAlaAlaLysProGlnThrArgGlyThrAspMetArgLysGluAspIleGlyGlyAspP
heThrLeuThrAspGlyGluGlyLysProPheAsn-74
76-SerAspLeuLysGly-80

91-HisCysProAspValCysPro-97
104-SerAspThrLeuLysGlnLeuGlyGlyGlnAlaLysAspValLys-118
124-IleAspProGluArgAspThrProGluIleIleGlyLysTyrAlaLysGlnPheAsnProAspPhe-145
150-AlaThrGlyGlyGln-154
169-LysValAsnGlnLysAspAspSerGluAsnTyrLeu-180
189-LeuIleAspLysAsnGlyGlu-195
200-SerProTyrGlySerGluProGluThrIleAlaAlaAspVal-213

Hydrophilic Regions - Hopp-Woods
22-LysProGlnAspAsnSerAla-28
39-SerAlaAlaGluAsnAlaAlaLysProGlnThrArgGlyThrAspMetArgLysGluAspIleGlyGly-61
64-ThrLeuThrAspGlyGluGlyLysPro-72
76-SerAspLeuLysGly-80
111-GlyGlyGlnAlaLysAspValLys-118
124-IleAspProGluArgAspThrProGluIleIle-134
169-LysValAsnGlnLysAspAspSerGluAsnTyrLeu-180
191-AspLysAsnGlyGlu-195
203-GlySerGluProGluThrIleAlaAlaAspVal-213
548-2 (from earlier--to be deleted)
AMPHI Regions - AMPHI
14-ValLeuAlaAlaLeuAlaAlaCysLys-22
39-SerAlaAlaGluAsnAlaAlaLysPro-47
89-PheThrHisCysProAspValCysProThr-98
103-TyrSerAspThrLeuLysGlnLeuGlyGlyGln-113
132-GluIleIleGlyLysTyrAlaLys-139

Antigenic Index - Jameson-Wolf
21-CysLysProGlnAspAsnSerAlaAla-29
39-SerAlaAlaGluAsnAlaAlaLysProGlnThrArgGlyThrAspMetArgLysGluAspIleGlyGlyAspP
heThrLeuThrAspGlyGluGlyLysProPheAsn-74
76-SerAspLeuLysGly-80
91-HisCysProAspValCysPro-97
104-SerAspThrLeuLysGlnLeuGlyGlyGlnAlaLysAspValLys-118
124-IleAspProGluArgAspThrProGluIleIleGlyLysTyrAlaLysGlnPheAsnProAspPhe-145
150-AlaThrGlyGlyGln-154
169-LysValAsnGlnLysAspAspSerGluAsnTyrLeu-180
189-LeuIleAspLysAsnGlyGlu-195
200-SerProTyrGlySerGluProGluThrIleAlaAlaAspVal-213

Hydrophilic Regions - Hopp-Woods
22-LysProGlnAspAsnSerAla-28
39-SerAlaAlaGluAsnAlaAlaLysProGlnThrArgGlyThrAspMetArgLysGluAspIleGlyGly-61
64-ThrLeuThrAspGlyGluGlyLysPro-72
76-SerAspLeuLysGly-80
111-GlyGlyGlnAlaLysAspValLys-118
124-IleAspProGluArgAspThrProGluIleIle-134
169-LysValAsnGlnLysAspAspSerGluAsnTyrLeu-180
191-AspLysAsnGlyGlu-195
203-GlySerGluProGluThrIleAlaAlaAspVal-213
552-1
AMPHI Regions - AMPHI
18-CysThrAsnAlaPheAlaAlaPro-25
29-AlaSerLeuAlaArgTrpLeuAspThr-37
41-AspArgAspIleGluLysAsnMetIleGluGlyPheAsnAlaGlyPheLysProTyrAlaAspLysAlaLeuA
laGluMet-67

75-AlaAlaGluAlaPheAsnArgTyrArgGluAsnVal-86
89-AspLeuIleThrProGluValLys-96
116-IleAspGlyMetIleAla-121
139-IleLysLysSerMetSerGluIle-146
154-SerGlyLysIleAlaGlnHisHisLeuProGluPheThrGluGluLeuArgArg-171

Antigenic Index - Jameson-Wolf
25-ProProSerAspAlaSerLeu-31
35-LeuAspThrGlnAsnPheAspArgAspIleGluLysAsnMetIle-49
58-ProTyrAlaAspLysAlaLeuAlaGluMetProGluAlaLysLysAspGlnAlaAla-76
78-AlaPheAsnArgTyrArgGluAsnValLeu-87
90-LeuIleThrProGluValLysGlnAlaVal-99
105-LysAsnAlaArgGluIleTyrThrGlnGluGluIleAspGly-118
131-ValValAlaLysAsnProArgLeuIleLysLysSerMetSer-144
153-LeuSerGlyLysIle-157
164-GluPheThrGluGluLeuArgArg-171
173-IleCysGlyGlyLysAsnProAspAlaGlyCysLysGlnAlaGlyGlnValGlyLysArgHisGlnLys-19
5

Hydrophilic Regions - Hopp-Woods
26-ProSerAspAlaSerLeu-31
38-GlnAsnPheAspArgAspIleGluLysAsnMetIle-49
58-ProTyrAlaAspLysAlaLeuAlaGluMetProGluAlaLysLysAspGlnAlaAla-76
78-AlaPheAsnArgTyrArgGluAsnValLeu-87
90-LeuIleThrProGluValLysGlnAlaVal-99
105-LysAsnAlaArgGluIleTyrThr-112
114-GluGluIleAspGly-118
131-ValValAlaLysAsnProArgLeuIleLysLysSerMetSer-144
164-GluPheThrGluGluLeuArgArg-171
176-GlyLysAsnProAspAlaGlyCysLysGlnAlaGlyGlnValGlyLysArgHisGlnLys-195
553-2
AMPHI Regions - AMPHI
31-LeuThrSerIleLeuSerTyrTyrGly-39
59-AsnLeuAlaAspIleMetArgPheGlyAsn-68
83-GluLeuSerAsnLeu-87

Antigenic Index - Jameson-Wolf
10-GlyPheAsnLysLysLeuPro-16
42-ThrAspLeuArgThrLeuArgGlnLysTyr-51
56-LysGlyAlaAsnLeu-60
65-ArgPheGlyAsnGluMetAsnLeuThrProArgAlaLeuArgLeuGluLeuAspGluLeuSerAsn-86
105-SerIleSerLysAspSerIle-111
116-ProAlaValGlyMetArgLysIleLysMetAspGluValSerGlnLys-131
143-ThrHisPheGluGluLysLysGluThrLysLysIleLys-155
160-LeuArgGlyGlyGlnAla-165

Hydrophilic Regions - Hopp-Woods
42-ThrAspLeuArgThrLeuArgGln-49
75-ArgAlaLeuArgLeuGluLeuAspGluLeuSer-85
106-IleSerLysAspSer-110
118-ValGlyMetArgLysIleLysMetAspGluValSerGln-130
144-HisPheGluGluLysLysGluThrLysLysIleLys-155
554
AMPHI Regions - AMPHI
35-AlaProThrPheGlnThrProGluThrLeu-44

71-AlaAlaLeuThrGlnLeuMet-77
110-ArgMetPheValArgProGlyAspThrVal-119
124-LeuLeuLysGlyMet-128
148-SerIleGluAsnPheValGlnGlnMetAsnLysGlu-159
193-GluAlaLeuMetArgAspPheProGluTyrTyrProLeuPheSer-207
296-ThrValAlaGlnIle-300
331-GluGlnIleLeuGluThrIleGlnProIleProAla-342

Antigenic Index - Jameson-Wolf
24-SerProAlaProAsnArgProThrVal-32
37-ThrPheGlnThrProGluThr-43
53-LeuGlnSerLysGln-57
61-AlaLysAsnIleAsnThrProValGlu-69
84-LysAsnMetLysSerGlyAsnIleGlnSerGluGluAsnLeuLysIleProGlu-101
104-TrpAlaSerGluGlySerArgMetPheValArgProGlyAspThrValSerThrAspLysLeuLeu-125
143-ArgLeuGlyAsnGlySerIleGluAsnPhe-152
156-MetAsnLysGluAlaArgArgLeuGlyMetLysAsnThrValPheLysAsnProThrGlyLeuSerArgGlu
GlyGlnValSerThrAlaLysAsp-187
194-AlaLeuMetArgAspPheProGluTyrTyr-203
214-LysAsnIleGluGlnAsnAsnArgAsnIleLeu-224
226-TyrArgAspAsnAsnValAsnGlyLeuLysAlaGlyHisThrGluSerGlyGlyTyrAsn-245
250-TyrSerGlyAsnGlyArgHis-256
262-LeuGlySerGluSerAlaGluThrArgAlaSerAspAsnSerLys-276
285-PheAspThrProLysIleTyrProLysGlyLysThr-296
302-IleSerGlyGlySerLysLysThrValArg-311
323-ProHisLysGluAlaLysMetAlaGluGlnIleLeu-334
342-AlaProValLysLysGlyGlnIleLeuGlyLysIleLysIleArgGlnAsnGlyTyr-360
362-IleAlaGluLysGluIleValAla-369
371-GluAsnValLysLysArgSerArgTrpGlnArg-381

Hydrophilic Regions - Hopp-Woods
26-AlaProAsnArgProThr-31
85-AsnMetLysSerGlyAsnIleGlnSerGluGluAsnLeuLysIleProGlu-101
107-GluGlySerArgMetPheValArgProGlyAspThrValSerThrAspLysLeuLeu-125
156-MetAsnLysGluAlaArgArgLeuGlyMet-165
174-ThrGlyLeuSerArgGluGlyGlnValSerThrAlaLysAsp-187
214-LysAsnIleGluGlnAsnAsnArg-221
227-ArgAspAsnAsnValAsn-232
237-GlyHisThrGluSerGly-242
264-SerGluSerAlaGluThrArgAlaSerAspAsnSerLys-276
289-LysIleTyrProLysGlyLysThr-296
304-GlyGlySerLysLysThrValArg-311
323-ProHisLysGluAlaLysMetAlaGluGlnIleLeu-334
343-ProValLysLysGlyGlnIle-349
353-IleLysIleArgGln-357
362-IleAlaGluLysGluIleValAla-369
371-GluAsnValLysLysArgSerArgTrp-379
556
AMPHI Regions - AMPHI
61-IleGluArgLeuLys-65

Antigenic Index - Jameson-Wolf
1-MetAspAsnLysThrLysLeuArgLeu-9
52-ThrSerArgArgGlnGlnArgGlnPheIleGluArgLeuLysLysPheAspIleAspProGluLysGlyArgI
leAsnGluAlaAsnLeuArgArgMetTyrHisSerGlyGlyGlnHisGlnLysAspAla-95

102-SerGlnLysCysSerValAspGluAlaHisAlaMetPheLysLysArgProThrArgGlnGluIleAsn-12
4
127-AlaAlaLysGlnSerArgGlyGlnLysArgProHisArg-139

Hydrophilic Regions - Hopp-Woods
1-MetAspAsnLysThrLysLeuArgLeu-9
53-SerArgArgGlnGlnArgGlnPheIleGluArgLeuLysLysPheAspIleAspProGluLysGlyArgIleA
snGluAlaAsnLeuArgArgMetTyr-85
90-GlnHisGlnLysAspAla-95
105-CysSerValAspGluAlaHisAlaMetPheLysLysArgProThrArgGlnGluIleAsn-124
127-AlaAlaLysGlnSerArgGlyGlnLysArgProHisArg-139
557
AMPHI Regions - AMPHI
22-GlyAlaAspGlyIle-26
55-SerGlyArgValAspAspAlaAla-62

Antigenic Index - Jameson-Wolf
20-LeuLysGlyAlaAspGlyIleSerProProLeuThrTyrArgSerTrpHisIleGluGlyGlyGlnAlaLeuA
rg-44
54-AlaSerGlyArgValAspAspAlaAlaGly-63
68-LeuArgIleAspSerValSerGlnAsnLysGluThrTyrThr-81
100-GlnValLeuLysArgGlyGluProValGlyLysProMet-112
123-AlaAspAsnGluIleLeuGlyLysGlnGluGluGluAla-135
141-MetArgGlnAspAlaAlaGluGlnIleValArg-151

Hydrophilic Regions - Hopp-Woods
21-LysGlyAlaAspGlyIle-26
56-GlyArgValAspAspAlaAlaGly-63
68-LeuArgIleAspSerValSerGlnAsnLysGluThrTyrThr-81
100-GlnValLeuLysArgGlyGluProValGly-109
126-GluIleLeuGlyLysGlnGluGluGluAla-135
141-MetArgGlnAspAlaAlaGluGlnIleValArg-151
560
AMPHI Regions - AMPHI
30-PheArgAspGlyAlaHisLysMetAlaArgValTrpValGly-43
167-ArgMetAlaLysMetPhe-172
192-PheLeuLysTyrProGlyGlu-198
216-GluLeuMetGluLysCysGluHisLeuIleGlu-226

Antigenic Index - Jameson-Wolf
29-ProPheArgAspGlyAlaHisLysMet-37
61-GlyAlaGluAsnIleProAspArgProAla-70
76-HisGlnSerGlyTrpGlu-81
95-ValAlaLysArgGluLeuPhe-101
116-IleGlyIleAspArgAsnAsnArgArgGluAlaAsnGluGlnLeuIle-131
134-GlyLeuValArgLysAsnGluGlyTyr-142
148-ProGluGlyThrArgLeuAlaProGlyLysArgGlyLysTyrLysLeuGlyGly-165
182-AsnSerGlyGluPheTrpProLysAsnSerPheLeuLysTyrProGlyGluIle-199
209-HisAlaSerGlySerGluAlaGluLeuMetGluLysCysGluHisLeuIle-225
242-MetProSerGluThrAla-247

Hydrophilic Regions - Hopp-Woods
29-ProPheArgAspGlyAlaHisLysMet-37
64-AsnIleProAspArgProAla-70
95-ValAlaLysArgGluLeuPhe-101

116-IleGlyIleAspArgAsnAsnArgArgGluAlaAsnGluGlnLeuIle-131
134-GlyLeuValArgLysAsnGlu-140
149-GluGlyThrArgLeuAlaProGlyLysArgGlyLysTyrLysLeuGlyGly-165
211-SerGlySerGluAlaGluLeuMetGluLysCysGluHisLeuIle-225
242-MetProSerGluThrAla-247
561
AMPHI Regions - AMPHI
22-GlyLeuTrpValGlyLeuAlaAla-29
46-AlaSerValIleGluGlyAlaGlyAsn-54
79-ValAlaGluPheGluLysSerLeuLysArgIleAlaGln-91
128-SerTyrArgArgProThrGlnVal-135
172-MetThrLeuValSerSer-177
188-ValIleArgProLeuGlnAlaLeuArgGluGlyAlaGluArgIleGlyArgArgCysPheAspIle-209
219-PheLysGlnValGlyArgCysPheAsnGlnMet-229
238-AspAspLeuGluGlyGlnValAlaGluGlnThrArgSerLeuGluLysGln-254
265-ThrArgAspLeuHisGlnSer-271
275-GlnGlnAlaAlaGluHisPhe-281

283-AsnArgIleLeuPro-287
317-AlaSerAspLeuGlyLysTyrHisGlu-325
339-ArgLeuLeuLeuSerPheProAsnGly-347
358-LeuGlnThrLeuGlyArgGlnLeuGly-366
392-GlnGlyLeuHisAspSerIleAlaGlnAlaLeuThr-403
434-GlyValGlnGluCysTyrGluAspValArgGluLeu-445
456-LysGluPheProGluAlaValAlaAspLeuPheAlaArgPhe-469
504-LeuSerAsnIleArgLysHisAlaArg-512
540-ThrGluLysIleGlyGluProThr-547

Antigenic Index - Jameson-Wolf
6-ArgPheSerAspGlyIleSer-12
48-ValIleGluGluAlaGlyAsn-54
66-AlaGlyGluGlySerProArgAlaGlnIleAspAsnGlnValAlaGluPheGluLysSerLeuLysArgIleA
laGlnSerAspAlaIleHisPro-97

99-IleProSerAspThrProLeu-105
124-ProProLeuGlnSerTyrArgArgProThrGlnValAspLeu-137
152-GluAsnAlaAsnGluLysAsnThr-159
193-GlnAlaLeuArgGluGlyAlaGluArgIleGlyArgArgCysPheAsp-208

210-ProValProGluGlyGlyThrProGluPheLysGlnValGlyArgCysPheAsnGlnMetGlyGlyArgLeu
LysIleLeuTyrAspAspLeuGluGlyGlnValAlaGluGlnThrArgSerLeuGluLysGlnAsnGlnAsnLeu-
258
263-GlnThrThrArgAspLeuHisGlnSerTyrIle-273
289-ValGlyAlaAspSerGlyArgValCysLeuAspGlyGlySerAsp-303
310-HisAlaAspCysGlyThrAlaAlaSerAspLeuGlyLysTyrHisGlu-325
332-TyrGlnAsnGluThrLeuGly-338
344-PheProAsnGlyIleSerLeuAspGluAspAspArgIleLeu-357
360-ThrLeuGlyArgGlnLeu-365
371-GlyAlaLysGlnGluGluGluLysArgLeu-380
384-LeuGlnGluArgAsnLeu-389
394-LeuHisAspSerIle-398
415-AlaPheAlaGluAsnLysArgGluGluAlaAlaGlu-426
434-GlyValGlnGluCysTyrGluAspValArgGlu-444
450-ArgThrLysIleSerAsnLysGluPheProGluAlaVal-462
480-AlaTrpGluAsnGlySer-485

488-ProProGlnGluAla-492
503-SerLeuSerAsnIleArgLysHisAlaArg-512
519-ThrLeuSerGluHisGlyGlyArgPhe-527
531-IleGlnAspAsnGlyGlnGlyPheAspThrGluLysIleGlyGluProThrGlySerHis-550
556-MetGlnGluArgAlaLysArgIle-563
568-GluIleArgSerGlnAlaGlnGlnGlyThrThr-578
584-AlaSerGluGluSerLeuLys-590

Hydrophilic Regions - Hopp-Woods
48-ValIleGluGluAlaGlyAsn-54
68-GluGlySerProArgAlaGlnIle-75
78-GlnValAlaGluPheGluLysSerLeuLysArgIleAlaGln-91
128-SerTyrArgArgProThrGln-134
152-GluAsnAlaAsnGluLys-157
193-GlnAlaLeuArgGluGlyAlaGluArgIleGlyArgArgCysPhe-207
213-GluGlyGlyThrProGluPheLysGlnValGly-223
235-IleLeuTyrAspAspLeuGluGlyGlnValAlaGluGlnThrArgSerLeuGluLysGlnAsnGln-256
264-ThrThrArgAspLeuHis-269
290-GlyAlaAspSerGlyArgValCysLeu-298

312-AspCysGlyThrAlaAlaSerAspLeuGlyLysTyrHisGlu-325
349-SerLeuAspGluAspAspArgIleLeu-357
371-GlyAlaLysGlnGluGluGluLysArgLeu-380
384-LeuGlnGluArgAsnLeu-389
415-AlaPheAlaGluAsnLysArgGluGluAlaAlaGlu-426
437-GluCysTyrGluAspValArgGlu-444
451-ThrLysIleSerAsnLysGluProProGluAlaVal-462
503-SerLeuSerAsnIleArgLysHisAlaArg-512

533-AspAsnGlyGlnGlyPheAspThrGluLysIleGlyGluProThrGly-548
556-MetGlnGluArgAlaLysArgIle-563
568-GluIleArgSerGlnAlaGln-574
584-AlaSerGluGluSerLeuLys-590

562
AMPHI Regions - AMPHI
48-TrpSerLeuValSerAlaTrpMetValValIle-58
84-LeuGluThrThrValMetSerAlaValArgThrLeu-95
97-PheThrProTyrThrThrValAlaSerThrSer-107
116-ThrPhePheAlaProLeuSerArgTrp-124
133-AsnAlaProValHisSerMetThrLysSerThrProSerSerPheHis-148
184-ValSerAsnLeuValArgTrpAlaLeu-192

Antigenic Index - Jameson-Wolf
9-PheAsnSerGlySerThrLysProThr-17
32-ProLeuArgAlaArgArgArgSerLeuTrpArg-42
72-AlaThrGlyGluArgGlnLeuVal-79
105-SerThrSerSerProProGlyAlaGluMet-114
139-MetThrLysSerThrProSerSerPheHisGlySerSerAla-152
154-LeuArgValGluLysLysGlyIleLeuSerProLeuThr-166
168-ArgLeuProProSerTrpAspThrSerAlaSerLysArgProCysThr-183

Hydrophilic Regions - Hopp-Woods
33-LeuArgAlaArgArgArgSerLeuTrp-41

72-AlaThrGlyGluArgGlnLeuVal-79
110-ProGlyAlaGluMet-114
140-ThrLysSerThrPro-144
154-LeuArgValGluLysLysGlyIle-161
176-SerAlaSerLysArgProCysThr-183
563
AMPHI Regions - AMPHI
24-ThrLysArgGluGlyLys-29
120-AsnGlnTyrAlaGlnPhe-125
164-ValAsnGlnIleAsnSerSerHisSerSer-173
246-AspPheThrArgIleLeuSerTyrHisSer-255
290-AlaAlaAsnThrSerAsnAsnThrAla-298
313-LysLeuGlyGlyMetTyr-318
366-LysAspThrAspAsn-370
443-AsnAsnGlnGlyLysLeu-448
483-SerSerAsnGlnThrGlyAsn-489
516-SerAsnIleThrAlaProThr-522
529-ArgThrHisGlyAlaLeuAsp-535
551-GlnGlnGlyLeuAsnAsnAlaGlyGlnIle-560
611-LeuAspAsnAlaHisGlyLysLeuLeuSerAla-621
736-LeuAspAsnAlaAlaGlnGly-742
775-GlnMetAsnAsnIleGlyThr-781
848-ThrGlyLysAlaGlnArgIleHisAsnAlaGlyAlaThrIleGlu-862
874-LeuHisAsnThrAsnGlu-879
896-TyrGluAlaPheGlyArg-901
922-SerAspHisLeuArgThrProAspGlyAlaAlaHisGluAsnTrp-936
953-ThrAlaProAlaLys-957
1011-LeuHisSerTyrTrpArg-1016
1036-GluGluIleThrArg-1040
1131-LeuHisLysArgLeuGlyAspGlyTyr-1139
1147-GluGlnIleAlaGluLeuThrGlyHisArgArgLeuAspGlyTyrGlnAsn-1163
1169-LysAlaLeuMetAsp-1173
1194-GlnValAlaGlnLeu-1198
1272-ThrLeuAspAsnIleGlyGly-1278
1289-AlaThrGlnAspIleAsnAsnIleGlyGlyMetLeu-1300
1376-GlnAlaGlyArgAspIle-1381
1403-IleArgGlySerThrAsnGluValGlySerSer-1413
1461-ValAspAspAlaSerLysHisThrGlyArg-1470
1485-SerHisHisGluThr-1489
1524-GlnAlaGlyAsnHisVal-1529
1539-GlnSerGluThrTyrHisGln-1545
1594-LysHisTyrGluGlnIleGlySerThrVal-1603
1646-ProValThrAspLeuAla-1651
1685-TyrGlnThrGlyLysSerAlaGlnAsnLeuAlaAsnGlyThrThrAsn-1700
1777-GluGlnSerAsnThrGluArgGlyGln-1785
1811-GlyGlyAsnValGlyLysGlyTyrGly-1819
1964-LysAsnHisSerGlnTyr-1969
1987-LeuGlyGlnGlyAlaGlnAsnLysProGln-1996
2064-ThrAspThrAlaGluArgHisSerGlySerLeuLysAsnThrPheAsn-2079
2093-ValSerGlnAspPheSerLysAsnValGln-2102
2161-IleLeuAsnMetLeuAlaSerGlyLeuAla-2170
2193-GlyGlnHisPheLysAspLeuAlaGly-2201
2223-LeuGlyAlaAlaValAla-2228
2275-AlaIleThrAsnValLeuGlyThrAlaThrGly-2285
2289-GlyAsnSerAlaThrAspAlaAla-2296

2332-HisLysAspProGly-2336
2379-IleThrArgGluPheGlyLysAspIleAla-2388
2393-AsnSerHisGluSer-2397
2414-AlaAspGluMetIleAspGlnLeuAsnAsnGluIle-2425

Antigenic Index - Jameson-Wolf
1-MetAsnLysThrLeu-5
9-IlePheAsnArgLysArgGlyAlaVal-17
22-GluThrThrLysArgGluGlyLysSerCysAlaAspSerAspSerGlySerAlaHis-40
83-IleIleAlaAspLysAlaAlaProLysThrGlnGln-94
127-ValGlyAsnArgGlyAlaIleLeuAsnAsnSerArgSerAsnThrGlnThr-143
152-AsnProTrpLeuAla-156
158-GlyGluAlaArgVal-162
167-IleAsnSerSerHisSerSerGlnMetAsnGly-177
179-IleGluValGlyGlyArgArgAlaGluVal-188
205-AsnAlaSerArgAlaThrLeu-211
213-ThrGlyGlnProGlnTyrGlnAlaGlyAspLeuSerGlyPheLysIleArgGlnGlyAsn-232
239-GlyLeuAspAlaArgAspThrAspPhe-247
252-SerTyrHisSerLysIleAspAla-259
264-GlnAspValArgVal-268
292-AsnThrSerAsnAsnThrAlaAsnAsnGlyThr-302
310-AspThrGlyLysLeuGlyGly-316
331-AlaGlyIleArgAsnGlnGlyGlnLeu-339
349-AspAlaAsnGlyArgLeuValAsn-356
364-AsnAlaLysAspThrAspAsnThrAlaGluHisLysValAsnIleArgSerGlnGlyValGluAsnSerGly
ThrAlaValSerGlnGlnGlyThrGlnIleHis-398
400-GlnSerIleGlnAsnThr-405
418-AsnSerGlySerLeuLysAsnGluThrSerGlyThrIleGluAlaAlaArgLeuAlaIleAspThrAspThr
LeuAsnAsnGlnGlyLysLeuSerGlnThrGlySerGlnLysLeuHisIle-458
460-AlaGlnGlyLysMetAspAsnArgGlyArgMetGlyLeuGlnAspThrAlaProThrAlaSerAsnGlySer
SerAsnGlnThrGlyAsnSerTyr-491
497-SerSerThrThrProThrThr-504
522-ThrPheAlaAspGlyThrIleArgThrHisGlyAlaLeuAspAsnSerGlySer-539
542-AlaAsnGlyGlnThrAspValSerAla-550
552-GlnGlyLeuAsnAsnAlaGlyGln-559
566-AsnAlaLysGlySerAla-571
573-AspAsnHisAsnGly-577
589-GlySerLeuAsnAsnGlnAsnGlyAsnIleThrThrArgGlnGlnLeuGluIleGluThrAspGlnLeuAsp
AsnAlaHisGly-616
631-SerLeuAsnAsnGlnAsnGlyGluIleAlaThrAsn-642
646-IleIleHisAspGlyGlnGlnSer-653
659-AsnThrAsnGlyThrIleGlnSerGlyArgAspValAlaIle-672
675-LysSerLeuSerAsnAsnGly-681
685-AlaAspAsnLysLeuAspIleAlaLeu-693
695-AspAspPheTyrValGlu-700
702-AsnIleValAlaGlyAsnGluLeu-709
711-LeuSerThrArgGlySerLeuLysAsnSerHisThr-722
725-AlaGlyLysArgIleArgIleLysAlaAsnAsnLeuAspAsnAlaAlaGlnGlyAsnIleGlnSerGlyGly
ThrThrAspIleGlyThrGlnHisAsnLeuThrAsnArgGlyLeuIleAspGlyGlnGlnThrLysIleGln-772
793-AlaThrArgLeuAspAsnGlnAspGluAsnGlyThrGly-805
809-AlaAlaArgGluAsnLeuAsn-815
821-LeuAsnAsnArgGluAsnSerLeu-828
839-GlyAlaLeuAspThrAsnGlyGlnAlaThrGlyLysAlaGlnArgIleHisAsnAlaGlyAla-859
863-AlaAlaGlyLysMetArgLeuGlyValGluLysLeuHisAsnThrAsnGluHisLeuLys-882
887-GluThrGlyArgGluHisIleVal-894

903-GluLeuLeuArgGluGlyThrGlnHis-911
917-ValTyrAsnAspGluSerAspHisLeuArgThrProAspGlyAlaAlaHis-933
937-HisLysTyrAspTyrGluLysValThrGlnLysThrGlnVal-950
960-SerGlyAsnAspLeuThrIleAspGlyLysGluValPheAsnThrAspSer-976
987-GlnThrGluLysAspGlyLeuHisAsnGluGlnThrPheGlyGluLysLysValPheSerGluAsnGlyLys
LeuHisSerTyrTrpArgGluLysHisLysGlyArgAspSerThrGlyHisSerGluGlnAsnTyrThrLeuProG
luGluIleThrArgAsn-1041
1050-GluSerHisArgLysAlaLeu-1056
1059-HisAlaProSerGlnGlyThrGluLeuProGlnSerAsnGlyIle-1073
1100-TyrLeuValGluThrAspProArgPheAlaAsn-1110
1124-LeuLysLeuAspProAsnAsnLeuHisLysArgLeuGlyAspGlyTyrTyrGluGlnArgLeuIleAsn-1
146
1153-ThrGlyHisArgArgLeuAspGlyTyrGlnAsnAspGluGluGlnPheLysAlaLeuMetAspAsnGlyA1
aThrAlaAlArgSerMetAsn-1183
1208-LysGluValLysLeuProAspGlyGlyThr-1217
1228-ArgValLysAsnGlyAspIleAspGlyLysGly-1238
1252-GlySerLeuLysAsSerGlyThrIleAlaGlyArgAsnAla-1265
1269-AsnThrAspThrLeuAspAsnIleGlyGly-1278
1280-IleHisAlaGlnLysSerAla-1286
1310-AlaGlyAsnAsnIleAsnSerGlnSerThrThrAlaSerSerGlnAsnThrGlnGlySerSerThrTyrLe
u-1333
1342-ThrGlyLysGluLysGlyVal-1348
1353-AlaGlyLysAspIleAsnIle-1359
1364-IleSerAsnGlnSerGluGlnGlyGlnThrArgLeuGlnAlaGlyArgAspIleAsnLeuAspThrValGl
nThrSerLysHisGln-1392
1396-PheAspAlaAspAsnHisValIleArgGlySerThrAsnGluValGlySerSerIleGlnThrLysGlyAs
pVal-1420
1425-GlyAsnAsnLeuAsnAlaLysAlaA1aGluValSerSerAlaAsnGly-1440
1446-AlaLysAsnAspIle-1450
1459-ThrHisValAspAspAlaSerLysHisThrGlyArgSerGlyGlyGlyAsnLysLeuValIle-1479
1481-AspLysAlaGlnSerHisHisGluThrAlaGlnSerSerThrPheGluGlyLysGln-1499
1503-GlnAlaGlyAsnAspAlaAsn-1509
1515-ValIleSerAspAsnGlyThrGlnI1eGlnAla-1525
1532-GlyThrThrGlnThrGlnSerGlnSerGluThrTyrHisGlnThrGlnLysSerGlyLeu-1551
1561-GlySerLysThrAsnThrGlnGluAsnGlnSerGlnSerAsnGluHisThrGlySerThrValGlySerLe
uLysGlyAspThrThrIle-1590
1592-AlaGlyLysHisTyrGluGlnIle-1599
1603-ValSerSerProGluGlyAsnAsn-1610
1621-AlaAlaHisAsnLysLeuAsnSerAsnThrThrGlnThrTyrGluGlnLysGlyLeu-1639
1659-GlnSerSerLysGlnValGlyGlnSerLysAsnAspArgValAsn-1673
1684-AlaTyrGlnThrGlyLysSerAlaGln-1692
1694LeuAlaAsnGlyThrThrAsnAlaLys-1702
1710-TyrGlyGluGlnGlnAsnArgGlnThrThrGln-1720
1729-SerGlnIleGlnAlaGlyGlyLysThrThr-1738
1744-AlaAlaGluGlnSerAsn-1749
1754-GlySerAspValAlaGlyLys-1760
1767-AlaAspAsnAspIleThr-1772
1774-GlnSerAlaGluGlnSerAsnThrGluArgGlyGlnAsnLysSerAlaGlyTrpAsn-1792
1812-GlyAsnValGlyLysGlyTyrGlyAsnGlyAspSerIleThrHisArgHisSerHisIleGlyAspLysGl
ySer-1836
1841-GlnSerGlyGlyAspThrThrI1eLys-1849
1851-AlaGlnValArgGlyLysGlyValGlnValAsnAlaLysAsn-1864
1869-SerValGlnAspArgGlu1874ThrTyrGlnSerLysGlnGlnAsnAla-1883
1895-AlaGlyGlyAspTyrSerGlnSerLysIleArgAlaAspHis-1908
1912-ThrGluGlnSerGlyIleTyrAlaGlyGluAspGlyTyrGln-1925

1929-GlyAsnHisThrAspLeuLysGlyGlyIle-1938
1942-ThrGlnSerAlaGluAspLysGlyLyAsnArgPheGln-1954
1959-ThrHisSerAspIleLysAsnHisSerGlnTyrLysGlyGluSerPhe Gly-1975
1982-IleSerGlyLysThrLeuGlyGlnGlyAlaGlnAsnLysProGlnAsnLysHis-1999
2003-ValAlaAspLysAsnSerAlaSer Ser-2011
2014-GlyTyrGlySerAspSerAspSerGlnSerSerIleThrLysSerGlyIleAsnThrArgAsn-2034
2036-GlnIleThrAspGluAlaAlaGln-2043
2045-ArgLeuThrGlyLysThrAlaAlaGlnThrLyAlaAspIleAspThrAsnValThrThrAspThrAlaGlu
ArgHisSerGlySerLeuLysAsnThrPheAsnLysGluAlaValGlnSerGluLeuAspLeuGlnArgThrValS
erGlnAspPheSerLysAsnValGlnGlnAlaAsnThrGluIle-2108
2110-GlnHisLeuAspLysLeuLysAlaAspLysGluAlaAlaGluThrAlaAla-2126
2131-AlaAsnGlyAspMetGluThrAlaLysArgLysAlaHisGluAlaGlnAspAlaAlaAlaLysAlaAspAs
nTrpGlnGln-2157
2172-ProThrGlnSerGly-2176
2195-HisPheLysAspLeuAlaGlyGlnAsnAlaAsnGlyLysLeuThrAlaSerGlnGluThr-2214
2231-GlyAspAsnAsnAla-2235
2241-SerAlaGlyGlySerGluAla-2247
2256-LeuTyrGlyLysGluLysGlySerAspLeuThrAlaGluGluLysGluThrVal-2273
2288-ValGlyAsnSerAlaThrAspAlaAlaGlnGlySerLeuAsnAla-2302
2304-SerAlaValGluAsnAsnAspThrValGluGlnVal-2315
2319-LeuArgHisProArg-2323
2331-ValHisLysAspProGlySerThrLeuGluProAsnIle-2343
2355-PheProAsnSerGluPheGlyGlyGluGlyGlyVal-2366
2379-IleThrArgGluPheGlyLysAspIleAlaVal-2389
2391-ValGlyAsnSerHisGluSerGlyGluLysIleAsnTyrSerIleArgArgAsnLeuSerLeuAspLysAl
aAspGluMetIleAsp-2419
2421-LeuAsnAsnGluIleGlyArgGluIleAla-2430
2432-AsnThrAsnArgLeuAsnThrLysGluLeu-2441
2447-GluThrTyrLysAsnAsnGlyPhe-2454
2456-GlnAlaGluArgAsnSerAsnGlyAsnTyrAspValValArgLysArgLeuSerGluLysAspTyrGlnAs
nThrSerAsn-2482
2496-IleGlnGlnArgArgLysGlnIleArg-2504
2510-ArgGlnTrpArgArg-2514

Hydrophilic Regions - Hopp-Woods
10-PheAsnArgLysArgGlyAla-16
22-GluThrThrLysArgGluGlyLysSerCysAlaAspSerAspSerGlySerAlaHis-40
83-IleIleAlaAspLysAlaAlaProLysThrGlnGln-94
136-AsnSerArgSerAsnThr-141
158-GlyGluAlaArgVal-162
181-ValGlyGlyArgArgAlaGluVal-188
224-SerGlyPheLysIleArgGln-230
240-LeuAspAlaArgAspThrAspPhe-247
331-AlaGlyIleArgAsn-335
364-AsnAlaLysAspThrAspAsnThrAlaGluHisLysValAsnIleArgSerGlnGlyValGluAsnSerGly
-387
420-GlySerLeuLysAsnGluThrSerGlyThrIleGluAlaAlaArgLeuAlaIleAspThrAspThrLeuAsn
Asn-444
446-GlyLysLeuSerGln-450
460-AlaGlnGlyLysMetAspAsnArgGlyArgMetGlyLeu-472
481-AsnGlySerSerAsnGlnThr-487
534-LeuAspAsnSerGly-538
544-GlyGlnThrAspValSerAla-550
602-GlnGlnLeuGluIleGluThrAspGlnLeuAspAsnAlaHis-615
635-GlnAsnGlyGluIleAlaThr-641

665-GlnSerGlyArgAspValAlaIle-672
685-AlaAspAsnLysLeuAspIleAlaLeu-693
715-GlySerLeuLysAsn-719
725-AlaGlyLysArgIleArgIleLysAlaAsnAsnLeuAspAsnAlaAla-740
767-GlnGlnThrLysIleGln-772
794-ThrArgLeuAspAsnGlnAspGluAsnGlyThr-804
809-AlaAlaArgGluAsnLeu-814
822-AsnAsnArgGluAsnSer-827
841-LeuAspThrAsnGly-845
847-AlaThrGlyLysAlaGlnArgIleHis-855
863-AlaAlaGlyLysMetArgLeuGlyValGluLysLeuHisAsnThrAsnGluHisLeuLys-882
887-GluThrGlyArgGluHisIleVal-894
903-GluLeuLeuArgGluGlyThrGlnHis-911
919-AsnAspGluSerAspHisLeuArgThrProAspGlyAlaAla-932
939-TyrAspTyrGluLysValThrGln-946
964-LeuThrIleAspGlyLysGluValPheAsn-973
987-GlnThrGluLysAspGlyLeuHisAsn-995
998-ThrPheGlyGluLysLysValPheSerGluAsnGlyLys-1010
1015-TrpArgGluLysHisLysGlyArgAspSerThrGlyHisSerGluGln-1030
1036-GluGluIleThrArg-1040
1050-GluSerHisArgLysAlaLeu-1056
1063-GlnGlyThrGluLeuProGln-1069
1104-ThrAspProArgPheAlaAsn-1110
1124-LeuLysLeuAspPro-1128
1130-AsnLeuHisLysArgLeuGly-1136
1153-ThrGlyHisArgArgLeuAspGlyTyrGlnAsnAspGluGluGlnPheLysAlaLeuMet-1172
1175-GlyAlaThrAlaAlaArg-1180
1208-LysGluValLysLeuProAspGlyGlyThr-1217
1229-ValLysAsnGlyAspIleAspGlyLysGly-1238
1252-GlySerLeuLysAsn-1256
1280-IleHisAlaGlnLysSerAla-1286
1324-GlnAsnThrGlnGly-1328
1343-GlyLysGluLysGlyVal-1348
1353-AlaGlyLysAspIleAsn-1358
1366-AsnGlnSerGluGlnGlyGlnThrArgLeuGlnAlaGlyArgAspIleAsnLeu-1383
1387-GlnThrSerLysHisGln-1392
1396-PheAspAlaAspAsnHisVal-1402
1406-SerThrAsnGluValGlySer-1412
1414-IleGlnThrLysGlyAspVal-1420
1428-LeuAsnAlaLysAlaAlaGluValSerSer-1437
1446-AlaLysAsnAspIle-1450
1460-HisValAspAspAlaSerLysHisThrGlyArgSerGlyGlyGly-1474
1481-AspLysAlaGlnSerHisHisGluThrAlaGln-1491
1493-SerThrPheGluGlyLysGln-1499
1537-GlnSerGlnSerGluThr-1542
1562-SerLysThrAsnThrGlnGluAsnGlnSerGlnSerAsnGluHisThrGly-1578
1584-LeuLysGlyAspThr-1588
1604-SerSerProGluGlyAsn-1609
1621AlaAlaHisAsnLysLeuAsnSer-1628
1634-TyrGluGlnLysGly-1638
1659-GlnSerSerLysGlnValGlyGlnSerLysAsnAspArgValAsn-1673
1686-GlnThrGlyLysSerAlaGln-1692
1712-GluGlnGlnAsnArgGlnThrThr-1719
1744-AlaAlaGluGlnSerAsn-1749
1756-AspValAlaGlyLys-1760

1767-AlaAspAsnAspIle-1771
1775-SerAlaGluGlnSerAsnThrGluArgGlyGlnAsnLys-1787
1822-AspSerIleThrHis-1826
1830-HisIleGlyAspLysGlySer-1836
1843-GlyGlyAspThrThrIleLys-1849
1851-AlaGlnValArgGlyLysGlyVal-1858
1869-SerValGlnAspArgGluThrTyrGlnSerLysGlnGlnAsnAla-1883
1897-GlyAspTyrSerGlnSerLysIleArgAlaAspHis-1908
1919-AlaGlyGluAspGlyTyrGln-1925
1932-ThrAspLeuLysGly-1936
1943-GlnSerAlaGluAspLysGlyLysAsnArgPhe-1953
1961-SerAspIleLysAsn-1965
1967-SerGlnTyrLysGlyGluSer-1973
1991-AlaGlnAsnLysProGlnAsnLysHis-1999
2003-ValAlaAspLysAsnSerAla-2009
2017-SerAspSerAspSerGlnSerSerIleThr-2026
2036-GlnIleThrAspGluAlaAlaGln-2043
2050-ThrAlaAlaGlnThrLysAlaAspIleAspThr-2060
2065-AspThrAlaGluArgHisSerGlySerLeu-2074
2077-ThrPheAsnLysGluAlaValGlnSerGluLeuAspLeuGlnArg-2091
2104-AlaAsnThrGluIle-2108
2110-GlnHisLeuAspLysLeuLysAlaAspLysGluAlaAlaGluThrAlaAla-2126
2133-GlyAspMetGluThrAlaLysArgLysAlaHisGluAlaGlnAspAlaAlaAlaLysAlaAspAsn-2154
2195-HisPheLysAspLeuAlaGly-2201
2208-LeuThrAlaSerGlnGluThr-2214
2243-GlyGlySerGluAla-2247
2257-TyrGlyLysGluLysGlySerAspLeuThrAlaGluGluLysGluThrVal-2273
2291-SerAlaThrAspAlaAlaGln-2297
2304-SerAlaValGluAsnAsnAspThrValGluGlnVal-2315
2319-LeuArgHisProArg-2323
2331-ValHisLysAspProGlySerThrLeu-2339
2379-IleThrArgGluPheGlyLys-2385
2393-AsnSerHisGluSerGlyGluLysIleAsnTyrSerIleArgArgAsnLeuSerLeuAspLysAlaAspGl
uMetIleAsp-2419
2424-GluIleGlyArgGluIleAla-2430
2435-ArgLeuAsnThrLysGluLeu-2441
2456-GlnAlaGluArgAsnSerAsnGly-2463
2466-AspValValArgLysArgLeuSerGluLysAspTyrGlnAsn-2479
2496-IleGlnGlnArgArgLysGlnIleArg-2504
2510-ArgGlnTrpArgArg-2514

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AMPHI Regions - AMPHI
6-TyrLysValValPhe-10
25-LysArgGluGlyLysAsnThr-31
40-LeuProAsnAspIleAlaGlyPheAlaGlyPheIleHisSerIleSer-55
118-AsnGlnTyrAlaGlnPhe-123
162-ValAsnGlnIleAsnSerSerHisSerSerGlnLeuAsn-174
244-AspTyrThrArgIleLeuSerTyrHisSer-253
288-AlaAlaAsnThrSerAsnAsnThrAla-296
311-LysLeuGlyGlyMetTyr-316
322-LeuIleSerThrValGluGln-328
390-SerGlnThrLeuAsp-394
407-ValArgAsnLeuGlyArgLeuLysAsnGlnAsn-417
433-LeuAspAsnThrGlyAsnIleThrGlnThrGly-443
449-LeuValSerAlaGlyLysPheAspAsnSer-458

478-IleProGlnIleProSerThr-484
518-IleGlnThrThrGlyAlaPheAspAsnAlaGlySerIleAsnAla-532
561-SerPheAsnAsnThrValLys-567
600-LeuHisAsnAlaGly-604
638-GlyLeuHisAsnAlaGly-643
658-LeuArgAsnThrGlyLysVal-664
736-LeuTyrAsnGlnHisGly-741
765-AspGlyThrIleGlnSerAla-771
841-AspAsnGlnValThrGlyLys-847
871-AspGlyLeuThrHisIleGlyAlaGly-879
882-LeuThrAsnThrGlyThrGlyLysIleTyr-891
958-AlaGlyMetAlaAspThrPheVal-965
980-SerValArgAsnMetGlnAsnIleAsnAsnHis-990
1000-AlaGluLysGlnVal-1004
1125-ThrGlnTrpAspSerValThrLys-1132
1185-IleLysLeuIleAspGlyValSerThr-1193
1263-HisLysArgLeuGlyAspGlyTyr-1270
1278-GluGlnIleHisGlnLeuThrGlyTyrArgArgLeuAspGlyTyr-1292
1299-PheLysAlaLeuMetAspAsn-1305
1325-GlnValAlaArgLeu-1329
1461-ThrAlaIleAspArgMetAlaGlyIleAsnValValGlySerHisThrGluGlnValAspAsnArg-1482
1504-SerAsnGlnValLysAspGlyThrThr-1512
1515-ThrAlaGlyAsnAsn-1519
1542-ArgHisValArgGlnSerThrGluVal-1550
1596-ArgGlnIleThrGluLeu-1601
1720-IleIleGlySerLeuAsn-1725
1791-AlaGlnAsnPheIleGlnAlaAlaGlnAsnValGlyLysSer-1804
1822-TyrGlnAlaThrGlnGlnMet-1828
1870-GluAlaAlaAlaSerGln-1875
1925-GlySerGluGlnSer-1929
1955-GlyGlyAsnIleGlyLysGlyLys-1962
2106-AspIleGlnAsnHisSer-2111
2138-GlnGlyArgProThrAspArgIleSerProAla-2148
2177-AlaGlyGlnLeuAlaArgThrGlyArgThrAlaLys-2188
2204-AspGlnHisSerGlyHisLeuLysAsnSerPhe-2214
2228-GluValThrLysGluPheGlyArgAsnAlaAla-2238
2243-AlaValAlaAspLysLeuGlyAsnThrGlnSerTyrGluArgTyrGln-2258
2297-ArgTyrAspThrTrpLysGlu-2303
2308-ArgSerIleLeuHisGlyAlaAlaGly-2316
2320-ThrGlySerLeuGlyGlyIleLeuAla-2328
2336-AlaProTyrLeuAspLysAlaAlaGluAsnLeuGlyPro-2348
2352-AlaAlaValAsnAlaLeuGly-2358
2395-LysTyrAlaGluAlaLeuLysArg-2402
2404-ValGluLysArgGluGly-2409
2424-GlnIleLeuArgTrpValAspLysGlySerGlnAspGly-2436
2470-GlnThrTyrAsnAspProLysLeuPheGluGluTyr-2481
2520-GluGlyLeuThrSerLeuVal-2526
2537-LeuAlaGlyIleArgAsnLeuLysAsnIle-2546
2571-ValAlaLysGlyAspArg-2576
2620-LysProGlnArgGln-2624
2647-AspValCysThrGluCys-2652
2669-ProGluIleGluArg-2673

Antigenic Index - Jameson-Wolf
10-PheAsnLysHisArgAsnCysMet-17

22-GluAsnAlaLysArgGluGlyLysAsnThrAlaAsp-33
82-ValAlaAspLysSerAlaProAlaGlnGlnGln-92
125-ValGlyAsnArgGlyAlaIleLeuAsnAsnSerArgSerAsnThrGlnThr-141
150-AsnProTrpLeuAla-154
156-GlyGluAlaArgVal-160
165-IleAsnSerSerHisSerSerGlnLeuAsnGly-175
177-IleGluValGlyGlyArgArgAlaGluVal-186
203-AsnAlaSerArgAlaThrLeu-209
214-ProGlnTyrGlnAlaGlyAspLeuSerGlyPheLysIleArgGlnGlyAsn-230
237-GlyLeuAspAlaArgAspThrAspTyrThrArg-247
250-SerTyrHisSerLysIleAspAla-257
262-GlnAspValArgVal-266
269-GlyGlnAsnAspValAlaAlaThrGlyAspAlaHisSerPro-282
290-AsnThrSerAsnAsnThrAlaAsnAsnGlyThr-300
308-AspThrGlyLysLeuGlyGly-314
327-GluGlnAlaGlyIleArgAsnGlnGlyGln-336
347-AsnAlaGluGlyLysLeuValAsn-354
361-ThrGlyGluAsnHis-365
373-AsnValHisAsnSerGlyThrValAlaSerGlnAspAspAlaAsnIleHis-389
391-GlnThrLeuAspAsnSerGlyThrVal-399
401-SerSerGlyArgLeuThrVal-407
409-AsnLeuGlyArgLeuLysAsnGlnAsnAsnGly-419
424-AlaArgLeuAspMetSerThrGlyGlyLeuAspAsnThrGlyAsnIleThrGlnThrGlySerGln-445
453-GlyLysPheAspAsnSerGlyLysIleGlyValSerAspValProGlnThrGlyLeuAsnProAsnProSer
Val-477
486-ThrGlySerGlySer-490
493-ValSerValSerLysProGlySerAsnAsnProValSerProThrAlaProAlaLysAsnTyrAla-514
525-AspAsnAlaGlySerIleAsnAlaGlyGlyGlnIleAsp-537
542-AsnGlyLeuGlyAsnSerGlySer-549
553-AlaLysLeuArgValSerGlyAspSerPheAsnAsnThrValLysGlyLysLeuGlnAla-572
580-GlnThrAlaLysAsnSerGlyHis-587
591-GlnThrGlyLysIleAspAsnArgGluLeuHisAsnAlaGlyGlu-605
615-HisSerGlyArgLeuSerAsnAspLysLysGlyAsnIle-627
647-AlaAspSerGlyThrValThrThrLysAsnAsnLeuArgAsnThrGlyLysValSerValAlaArgLeuAsn
ThrGluGlyGlnThrLeuAspAsnThrArgGlyArgIleGluAlaGluThrValAsn-689
694-GlnLeuThrAsnGlnSerGlyHis-701
710-IleAsnSerArgAsnValAspAsnGlnAsnGlyLysLeuLeuSer-724
732-ValSerAspGlyLeuTyrAsnGlnHisGly-741
750-SerIleHisAspLysAsnGlnAsnThr-758
761-LeuAsnAsnAlaAspGlyThrIle-768
780-SerLeuAlaAsnAsnGlyThr-786
789-AlaGlyAsnLysLeuAsp-794
797-LeuThrAspAspPheValValGluArgAspLeuThrAlaGlyLys-811
817-IleLysGlyArgLeuLysAsnThrHisThr-826
836-AsnAlaGlyAsnIleAspAsnGlnVal-844
849-IleGlyGlyGluGlnThrAspIleThrSerGluGlnHisValAspAsnArgGlyLeuIleAsnSerAspGly
-872
881-ThrLeuThrAsnThrGlyThrGlyLysIleTyr-891
903-LeuAsnArgGluGluThrThrGluGlySerThrLysAla-915
919-AlaAlaArgLysArgLeuAspIleGlyAlaLysGluIleHisAsnGlnGluGly-936
939-LeuSerSerGluGly-943
948-GlyAsnArgLeuAspGluGlnHisHis-956
985-GlnAsnIleAsnAsnHisPheLysThrGluThrTyrLeuAlaLysAlaGluLysGlnValArgAsp-1006
1017-GlnAlaGlyLysAspGlyLeuPheAspAsnSerGlnGlyGlnLysAspGlnThrThr-1035
1039-HisLeuLysAsnGlySerArgIleGluAla-1048

1060-ThrTyrLysGluArgIleIleGluAsnArgProAlaHis-1072
1076-GlyGlyAspLeuThrAlaSerGlyGlnAsnTrpLeuAsnLysAspSerArgIle-1093
1098-ArgIleIleThrAspAspLeuAsnGlnLysGluIleThrAsnGlnSerThrThrGlyLysGlyArgThrAs
pAlaVal-1123
1126-GlnTrpAspSerValThrLysLysGlyTrpTyrSerGlyArgLysArgGlnArgArgThrGluArgAsnHi
sThrProTyrHisAsp-1154
1160-HisAspPheAspThrProVal-1166
1172-AsnAlaAlaSerProSerPhe-1178
1196-ValAsnGlyGlnArgIleHisThr-1203
1223-ThrThrHisProAspAsnLysGlyTrp-1231
1234-GluThrAspProGlnPheAlaAspTyrArgArgTrpLeuGlySerAspTyr-1250
1258-AspThrAsnHisLeuHisLysArgLeuGlyAspGlyTyrTyrGluGlnLysLeuValAsn-1277
1285-GlyTyrArgArgLeuAspGlyTyrArgSerAspGluGluGlnPheLysAlaLeuMetAspAsnGly-1306
1343-LeuSerAspGlySerThrGln-1349
1359-LeuAlaArgLysGlyAspLeuAsnThrSerGlyGly-1370
1382-GlnAsnGlyAsnLeuThrAsn-1388
1403-ArgAsnIleAsnSerAsnGlyAsnIleGln-1412
1416-IleGlyLeuLysAlaGluLysSerIleAsnIleAspGlyGlyGlnValGln-1432
1445-AsnLeuAsnGlyThrThrGlnThrSerGlyAsnGluArgAsnGlyAsnThrAlaIleAspArgMetAla-1
467
1473-GlySerHisThrGluGlnValAspAsnArgThrSerAspGly-1486
1491-HisAlaSerAsnAspIle-1496
1503-ValSerAsnGlnValLysAspGlyThrThr-1512
1525-IleArgThrGluHisArgGluAlaTyrGlyThrLeuAspAspGluAsnHisArgHisValArgGlnSerTh
rGluValGlySerSerIleArgThrGlnAsnGly-1559
1564-AlaGlyAsnAspLeuLysIleArgGlnGlyGluLeuGluAlaGluGluGlyLysThr-1582
1586-AlaGlyArgAspValThrIleSerGluGlyArgGlnIleThrGluLeuAspThrSerValSerGlyLysSe
rLysGlyIleLeuSerSerThrLysThrHisAspArgTyrArgPheSerHisAspGluAlaVal-1630
1633-AsnIleGlyGlyGlyLysMet-1639
1644-GlyGlnAspIleAsnValArgGlySerAsnLeuIleSerAspLysGlyIleVal-1661
1664-AlaGlyHisAspIleAspIleSerThrAlaHisAsnArgTyrThrGlyAsnGluTyrHisGluSerLysLy
sSerGlyVal-1690
1699-ThrIleGlyAsnArgLysThrThrAspAspThrAspArgThrAsnIle-1714
1723-SerLeuAsnGlyAspThr-1728
1732-AlaGlyAsnArgTyrArgGlnThrGlySerThrValSerSerProGluGlyArgAsnThrValThr-1753
1761-PheAlaAsnAsnArgTyrAlaThrAspTyrAlaHisThrGlnGluGlnLysGly-1778
1799-GlnAsnValGlyLysSerLysAsnLysArgValAsn-1810
1832-AlaProSerSerSerAlaGlyGlnGlyGlnAsnAsnAsnGlnSerProSerIle-1849
1854-ThrTyrGlyGluGlnLysSerArgAsnGluGlnLysArgHisTyrThr-1869
1878-GlyLysGlyGlnThr-1882
1886-AlaThrGlySerGlyGluGlnSerAsnIleAsn-1896
1898-ThrGlySerAspVal-1902
1919-GlnSerAlaLysGlnAspGlySerGluGlnSerLysAsnLysSerSerGlyTrpAsnAla-1938
1954-AlaGlyGlyAsnIleGlyLysGlyLysGluGlnGlyGlySerThrThrHisArgHisThrHisValGlySe
rThrThrGlyLysThrThrIleArgSerGlyGlyAspThrThrLeu-1992
1999-GlyLysGlyIleGlnAlaAspThrArgAsnLeuHis-2010
2013-SerValGlnAspThrGluThrTyrGlnSerLysGlnGlnAsnGlyAsn-2028
2038-SerAlaSerGlySerTyrArgGlnSerLysValLysAlaAspHis-2052
2062-TyrAlaGlyGluAspGlyTyrGlnIleLysValArgAspAsnThrAspLeuLysGly-2080
2086-SerGlnSerAlaGluAspLysGlyLysAsnLeuPhe-2097
2105-SerAspIleGlnAsnHisSerArgTyrGluGlyArgSerPheGly-2119
2126-LeuAsnGlyGlyTrpAspGlyThrValThrAspLysGlnGlyArgProThrAspArgIleSerPro-2147
2151-TyrGlySerAspGlyAspSerLysAsnSerThrThrArgSerGlyValAsnThrHis-2169
2173-IleThrAspGluAlaGlyGlnLeuAlaArgThrGlyArgThrAlaLysGluThrGluAlaArgIle-2194

2197-GlyIleAspThrGluThrAlaAspGlnHisSerGlyHisLeuLysAsnSerPheAspLysAspAlaValAl
aLysGluIleAsnLeuGlnArgGluValThrLysGluPheGlyArgAsnAlaAla-2238
2244-ValAlaAspLysLeuGlyAsnThrGlnSerTyrGluArgTyrGlnGluAlaArgThrLeuLeu-2264
2266-AlaGluLeuGlnAsnThrAspSerGluAlaGluLysAlaAlaPhe-2280
2292-AlaGluAsnGlnSerArgTyrAspThrTrpLysGluGlyGlyIleGlyArgSerIle-2310
2338-TyrLeuAspLysAlaAlaGluAsnLeuGlyProAlaGly-2350
2378-ValAspTrpAsnAsnArgGlnLeuHisProLysGluMetAlaLeu-2392
2394-AspLysTyrAlaGluAlaLeuLysArgGluValGluLysArgGluGlyArgLysIleSerSerGlnGluAl
aAlaMetArgIleArgArgGlnIle-2425
2428-TrpValAspLysGlySerGlnAspGlyTyrThrAspGlnSerVal-2442
2448-MetLysGlyGluAspLysAlaLeu-2455
2460-AspTyrArgAspTyrGlyAlaArgAsnProGlnThrTyrAsnAspProLysLeuPheGluGluTyrArgAr
gGlnAspLysProGluTyrArgAsn-2491
2496-HisSerGlyThrLysAspThrLysIleArgGlnGlyGluArgLysAsnGluGluPhe-2514
2527-AsnProAsnProArgIleLysVal-2534
2541-ArgAsnLeuLysAsnIleLysProThrValThrGlySerAspPro-2555
2569-GlyAsnValAlaLysGlyAspArgIleProAspThrAlaLeuAlaSerLysGlyIleLysHisLysAsnAr
gLysAspGlnLeuGluLysAsnLysSerGlyGluAspPheGluMet-2608
2610-IleTyrGlnLysLysValLysGlnGlyPheLysProGlnArgGlnIleThrValLysThrLysSerGlyVa
lLysThrArgLeuAspIleIleSerLysGluGlyGlyLeuAspValCysThrGluCysLysAla-2654
2659-ProLeuThrLysAsnGlnLysLysAlaPheProGluIleGluArgThrGlyAla-2676
2680-GlyLysGlyLysProGlyTyrProLysGlyThrLysIleGluProThrLysValIleIleGluArgLysAr
g-2703

Hydrophilic Regions - Hopp-Woods
10-PheAsnLysHisArgAsn-15
22-GluAsnAlaLysArgGluGlyLysAsnThrAlaAsp-33
82-ValAlaAspLysSerAlaPro-88
134-AsnSerArgSerAsnThr-139
156-GlyGluAlaArgVal-160
179-ValGlyGlyArgArgAlaGluVal-186
222-SerGlyPheLysIleArgGln-228
238-LeuAspAlaArgAspThrAspTyr-245
271-AsnAspValAlaAla-275
329-AlaGlyIleArgAsn-333
348-AlaGluGlyLysLeu-352
361-ThrGlyGluAsnHis-365
381-AlaSerGlnAspAspAlaAsnIle-388
409-AsnLeuGlyArgLeuLysAsnGlnAsn-417
424-AlaArgLeuAspMet-428
453-GlyLysPheAspAsnSerGlyLysIleGlyVal-463
494-SerValSerLysProGlySer-500
553-AlaLysLeuArgValSerGly-559
566-ValLysGlyLysLeuGlnAla-572
580-GlnThrAlaLysAsnSer-585
593-GlyLysIleAspAsnArgGluLeuHisAsn-602
618-ArgLeuSerAsnAspLysLysGlyAsnIle-627
650-GlyThrValThrThr-654
656-AsnAsnLeuArgAsnThrGlyLys-663
669-LeuAsnThrGluGlyGlnThrLeuAspAsnThrArgGlyArgIleGluAlaGluThr-687
713-ArgAsnValAspAsnGlnAsn-719
750-SerIleHisAspLysAsnGlnAsn-757
763-AsnAlaAspGlyThrIle-768
801-PheValValGluArgAspLeuThrAla-809
817-IleLysGlyArgLeuLysAsn-823

852-GluGlnThrAspIleThrSer-858
860-GlnHisValAspAsnArgGlyLeuIle-868
903-LeuAsnArgGluGluThrThrGluGlySerThrLysAla-915
919-AlaAlaArgLysArgLeuAspIleGlyAlaLysGluIleHisAsnGlnGlu-935
949-AsnArgLeuAspGluGlnHisHis-956
995-ThrTyrLeuAlaLysAlaGluLysGlnValArgAsp-1006
1018-AlaGlyLysAspGlyLeuPhe-1024
1027-SerGlnGlyGlnLysAspGlnThr-1034
1042-AsnGlySerArgIleGluAla-1048
1060-ThrTyrLysGluArgIleIleGluAsnArgPro-1070
1087-LeuAsnLysAspSerArgIle-1093
1099-IleIleThrAspAspLeuAsnGlnLysGluIleThrAsn-1111
1114-ThrThrGlyLysGlyArgThrAspAlaVal-1123
1134-GlyTrpTyrSerGlyArgLysArgGlnArgArgThrGluArgAsnHis-1149
1235-ThrAspProGlnPheAlaAspTyrArgArg-1244
1261-HisLeuHisLysArgLeuGly-1267
1287-ArgArgLeuAspGlyTyrArgSerAspGluGluGlnPheLysAlaLeuMet-1303
1360-AlaArgLysGlyAspLeuAsnThr-1367
1416-IleGlyLeuLysAlaGluLysSerIleAsn-1425
1453-SerGlyAsnGluArgAsnGlyAsnThrAlaIleAspArgMetAla-1467
1475-HisThrGluGlnValAspAsnArgThrSerAsp-1485
1505-AsnGlnValLysAspGlyThrThr-1512
1525-IleArgThrGluHisArgGluAlaTyrGlyThrLeuAspAspGluAsnHisArgHisValArgGlnSerTh
rGluVal-1550
1554-IleArgThrGlnAsn-1558
1564-AlaGlyAsnAspLeuLysIleArgGlnGlyGluLeuGluAlaGluGluGlyLysThr-1582
1586-AlaGlyArgAspValThrIleSerGluGlyArgGlnIleThrGluLeuAspThr-1603
1605-ValSerGlyLysSerLysGlyIle-1612
1616-ThrLysThrHisAspArgTyrArgPheSerHisAspGluAlaVal-1630
1647-IleAsnValArgGly-1651
1653-AsnLeuIleSerAspLysGlyIleVal-1661
1664-AlaGlyHisAspIleAspIle-1670
1681-GluTyrHisGluSerLysLysSerGlyVal-1690
1701-GlyAsnArgLysThrThrAspAspThrAspArgThrAsn-1713
1734-AsnArgTyrArgGlnThrGly-1740
1744-SerSerProGluGlyArgAsnThrValThr-1753
1774-GlnGluGlnLysGly-1778
1800-AsnValGlyLysSerLysAsnLysArgValAsn-1810
1836-SerAlaGlyGlnGlyGlnAsnAsnAsnGln-1845
1856-GlyGluGlnLysSerArgAsnGluGlnLysArgHisTyrThr-1869
1888-GlySerGlyGluGlnSerAsn-1894
1919-GlnSerAlaLysGlnAspGlySerGluGlnSerLysAsnLysSerSer-1934
1957-AsnIleGlyLysGlyLysGluGlnGlyGly-1966
1982-ThrThrIleArgSerGlyGlyAspThrThrLeu-1992
2002-IleGlnAlaAspThrArgAsnLeuHis-2010
2013-SerValGlnAspThrGluThrTyrGlnSerLysGlnGlnAsn-2026
2041-GlySerTyrArgGlnSerLysValLysAlaAspHis-2052
2063-AlaGlyGluAspGlyTyrGlnIleLysValArgAspAsnThrAspLeuLysGly-2080
2087-GlnSerAlaGluAspLysGlyLysAsn-2095
2111-SerArgTyrGluGlyArgSer-2117
2133-ThrValThrAspLysGlnGlyArgProThrAspArgIleSerPro-2147
2152-GlySerAspGlyAspSerLysAsnSerThrThrArgSerGlyVal-2166
2173-IleThrAspGluAlaGlyGln-2179
2181-AlaArgThrGlyArgThrAlaLysGluThrGluAlaArgIle-2194
2198-IleAspThrGluThrAlaAspGlnHisSerGlyHisLeu-2210

2212-AsnSerPheAspLysAspAlaValAlaLysGluIleAsnLeuGlnArgGluValThrLysGluPheGlyAr
g-2235
2244-ValAlaAspLysLeuGlyAsn-2250
2252-GlnSerTyrGluArgTyrGlnGluAlaArgThrLeuLeu-2264
2266-AlaGluLeuGlnAsnThrAspSerGluAlaGluLysAlaAlaPhe-2280
2294-AsnGlnSerArgTyrAspThrTrpLysGluGlyGlyIle-2306
2338-TyrLeuAspLysAlaAlaGluAsnLeuGlyProAlaGly-2350
2384-GlnLeuHisProLysGluMetAlaLeu-2392
2394-AspLysTyrAlaGluAlaLeuLysArgGluValGluLysArgGluGlyArgLysIleSerSerGlnGluAl
aAlaMetArgIleArgArgGlnIle-2425
2428-TrpValAspLysGlySerGlnAspGlyTyrThr-2438
2448-MetLysGlyGluAspLysAlaLeu-2455
2460-AspTyrArgAspTyrGlyAlaArgAsnProGlnThrTyrAsnAsp-2474
2476-LysLeuPheGluGluTyrArgArgGlnAspLysProGluTyrArg-2490
2498-GlyThrLysAspThrLysIleArgGlnGlyGluArgLysAsnGluGluPhe-2514
2528-ProAsnProArgIleLys-2533
2541-ArgAsnLeuLysAsnIleLys-2547
2570-AsnValAlaLysGlyAspArgIleProAsp-2579
2585-LysGlyIleLysHisLysAsnArgLysAspGlnLeuGluLysAsnLysLysSerGlyGluAspPheGluMe
t-2608
2610-IleTyrGlnLysLysValLysGlnGlyPheLysProGlnArg-2623
2625-IleThrValLysThrLysSerGlyValLysThrArgLeuAspIleIleSerLysGluGlyGlyLeu-2646
2648-ValCysThrGluCysLysAla-2654
2660-LeuThrLysAsnGlnLysLysAlaPheProGluIleGluArgThrGly-2675
2680-GlyLysGlyLysProGlyTyrProLysGlyThrLysIleGluProThrLysValIleIleGluArgLysAr
g-2703
565
AMPHI Regions - AMPHI
50-AlaThrCysThrArgAlaMetSerLysSer-59
66-SerSerTrpAlaArg-70
84-IleSerThrTrpSerAspLeu-90
103-AspPheMetSerGlnLeuAspLeuThr-111
140-SerHisSerGlyGluThrIleSerSerCysProAlaMetAlaSerIleThrLysProAsn-159
184-AlaAsnThrThrSerAlaPhe-190

Antigenic Index - Jameson-Wolf
1-MetAspSerThrLeuSerLysThrCys-9
23-PheAlaArgProArgProAlaAlaSerAsnThrSerLeu-35
37-PheAlaSerProAsnAspThrGlySer-45
55-AlaMetSerLysSerSerAlaLysTyrGly-64
67-SerTrpAlaArgThrArgProThrValCysProProLeuProLysProThrIle-84
99-CysArgSerSerAspPheMetSer-106
109-AspLeuThrLysArgProThrSerAlaSerLeuProProLysArgLysGlyAlaIle-127
129-IleAspSerArgThrAlaAla-135
140-SerHisSerGlyGluThrIleSerSer-148
154-SerIleThrLysProAsnSerProProCysAlaArgTyr-166
170-LeuArgLeuSerProThrGlu-176
194-SerIleAlaAsnSerIleAsnThrCysArgGlnProPro-206

Hydrophilic Regions - Hopp-Woods
24-AlaArgProArgProAlaAla-30
39-SerProAsnAspThrGlySer-45
55-AlaMetSerLysSerSerAla-61
69-AlaArgThrArgPro-73
100-ArgSerSerAspPhe-104

109-AspLeuThrLysArgProThrSer-116
119-LeuProProLysArgLysGlyAlaIle-127
129-IleAspSerArgThr-133
141-HisSerGlyGluThrIleSer-147
156-ThrLysProAsnSer-160
566
Hydrophilic Regions - Hopp-Woods
29-ProPheArgAspGlyAlaHisLysMet-37
64-AsnIleProAspArgProAla-70
95-ValAlaLysArgGluLeuPhe-101
116-IleGlyIleAspArgAsnAsnArgArgGluAlaAsnGluGlnLeuIle-131
134-GlyLeuValArgLysAsnGlu-140
149-GluGlyThrArgLeuAlaProGlyLysArgGlyLysTyrLysLeuGlyGly-165
211-SerGlySerGluAlaGluLeuMetGluLysCysGluHisLeuIle-225
242-MetProSerGluThrAla-247

Antigenic Index - Jameson-Wolf
32-PheAlaValAspProAsnCysGlyAlaAspGlyThrGlyGlyLysGlyHisAla-49
61-AlaValGlyGlyGluGluGlyGlyValValAlaAspAspValAlaCysAlaAspGlyGlyLysAlaAspGlyA
rgArgIleAlaArg-89
105-SerAlaGluArgAlaGlyAspAspPheAla-114

Hydrophilic Regions - Hopp-Woods
36-ProAsnCysGlyAlaAspGlyThrGlyGlyLysGlyHisAla-49
63-GlyGlyGluGluGlyGlyValValAlaAspAspValAlaCys-76
78-AspGlyGlyLysAlaAspGlyArgArgIleAlaArg-89
105-SerAlaGluArgAlaGlyAspAspPheAla-114
567
AMPHI Regions - AMPHI
60-GlyValTyrGlnVal-64
98-GluLeuValGlnGluIleAlaArgGluVal-107
112-AlaLeuLysAlaVal-116
154-TyrAlaLeuGluGlyIleSerAspLeuIleAlaThrValArgLysIleArgGln-171
180-ThrGlyIleValArg-184
195-AlaGluValSerGluGlnLeuArgSerHisPheGlyAspLeuLeu-209

Antigenic Index - Jameson-Wolf
10-AsnGlnLysGlyGlyValGlyLysThrThrThr-20
28-LeuAlaSerArgGlyLysArg-34
"

"
38-ValAspLeuAspProGlnGlyAsnAlaThrThrGlySerGlyIleAspLysAlaGlyLeuGlnSerGly-60
67-GlyAspAlaAspValGln-72
75-AlaValArgSerLysGluGlyGly-82
95-AlaGluIleGluLeu-99
101-GlnGluIleAlaArgGluValArgLeuLysAsnAlaLeuLysAlaValGluGluAspTyrAsp-121
127-CysProProSerLeu-131
164-AlaThrValArgLysIleArgGlnAlaValAsnProAspLeuAspIle-179
"

"
185-ThrMetTyrAspSerArgSerArgLeuValAlaGluValSerGluGlnLeuArgSerHisPheGlyAspLeu
-208
214-IleProArgAsnIleArgLeuAlaGluAlaProSerHisGly-227

235-AlaGlnAlaLysGlyThrLys-241
248-AspGluLeuAlaAlaArgValSerGlyLys-257

Hydrophilic Regions - Hopp-Woods
10-AsnGlnLysGlyGlyValGlyLys-17
28-LeuAlaSerArgGlyLysArg-34
"

"
40-LeuAspProGlnGly-44
50-SerGlyIleAspLysAlaGlyLeu-57
67-GlyAspAlaAspValGln-72
75-AlaValArgSerLysGluGlyGly-82
95-AlaGluIleGluLeu-99
"

"
101-GlnGluIleAlaArgGluValArgLeuLysAsnAlaLeuLysAlaValGluGluAspTyrAsp-121
164-AlaThrValArgLysIleArgGln-171
"

"
175-ProAspLeuAspIle-179
"

"
186-MetTyrAspSerArgSerArgLeuValAlaGluValSerGluGlnLeuArg-202
216-ArgAsnIleArgLeuAlaGluAlaProSer-225
235-AlaGlnAlaLysGlyThrLys-241
248-AspGluLeuAlaAla-252

568
AMPHI Regions - AMPHI
32-AsnIlePheArgArgIle-37
49-LysAlaCysLysAsn-53
71-GluLysAlaAsnThrValArgTyr-78
82-SerLeuAlaGlnCysPheThr-88
112-ArgProLeuProSerIleIleThrAla-120
169-GluPheValGlyPheGlyAsnValPheValGlyGlnPheLeuAsnArgPhePhe-186
200-GluGluPhePheAspValValVal-207
228-PheAsnGlnValPheAlaAlaPheLeu-236
241-HisArgHisAlaAspGlnValAlaAspSerCysArgValGlnSerGln-256

Antigenic Index - Jameson-Wolf
14-SerAlaSerSerMetProCysArgIleCysArgLeuLysArgSerArgLeuProAsnIlePhe-34
39-PheSerCysArgArgArgThrCysPheCysLysAlaCysLysAsnSerProIleArgAsnGluThrSerSerS
erGlyArgArgGlnPheSerValGluLysAlaAsnThr-75
91-SerAsnAlaSerLysProArgLeu-98
100-ProIleMetArgGlyArgLysArgPhePheAla-110
141-PheArgGlySerAlaPheLysCysArgLeuAsnAlaGluProCysArg-156
213-ValAlaAspArgAspAlaAla-219
237-GlyGlnHisGlyHisArgHisAlaAspGlnValAlaAspSerCysArgValGlnSerGln-256

Hydrophilic Regions - Hopp-Woods
21-ArgIleCysArgLeuLysArgSerArgLeu-30

41-CysArgArgArgThrCysPhe-47
49-LysAlaCysLysAsnSerProIleArgAsnGluThrSerSerSerGlyArgArgGlnPheSerValGluLysA
laAsnThr-75
93-AlaSerLysProArgLeu-98
102-MetArgGlyArgLysArgPhePheAla-110
144-SerAlaPheLysCysArgLeuAsnAlaGluProCysArg-156
213-ValAlaAspArgAspAlaAla-219
239HisGlyHisArgHisAlaAspGlnValAlaAspSerCysArgVal-253
569
AMPHI Regions - AMPHI
29-AlaAlaPheCysGlyLeuIleAlaLeuIleAlaLeuTrpGluTyrAlaArgMetGlyGlyLeuCysLys-51
86-PheTrpLeuAlaValMetPro-92
166-SerProGlyLysSerTrpGluGlyAlaIle-175
203-ThrValLeuIleGlyLeu-208
210-LeuThrValValSerValCysGlyAspLeuLeuGluSerTrpLeuLys-225
229-GlyIleLysAspSerSer-234

Antigenic Index - Jameson-Wolf
50-CysLysIleLysThrAsnHis-56
98-LysTrpArgLeuAsnGlyGlyTrp-105
124-SerLeuArgProHisProAspAspAlaLeu-133
154-LysAlaPheGlyLysHisLysIle-161
165-IleSerProGlyLysSerTrpGlu-172
227-AlaAlaGlyIleLysAspSerSerLysLeuLeuProGlyHis-240
242-GlyValPheAspArgThrAspSer-249

Hydrophilic Regions - Hopp-Woods
50-CysLysIleLysThr-54
127-ProHisProAspAspAlaLeu-133
155-AlaPheGlyLysHisLysIle-161
227-AlaAlaGlyIleLysAspSerSerLys-235
243-ValPheAspArgThrAspSer-249
570
AMPHI Regions - AMPHI
6-ArgAlaPheAlaAlaAlaLeuIleGlyLeu-15
22-HisAlaAspThrPheGlnLysIleGlyPheIleAsn-33
43-GlnAlaArgLysIleGlnLysThrLeuAspSer-53
60-AspGluLeuGlnLysLeuGln-66
81-LeuArgAsnAlaLysLys-86
91-GluLysTrpArgGlyLeuValAla-98
122-LeuGlnGlnAsnAlaAsnArgValIleValLysIle-133

Antigenic Index - Jameson-Wolf
33-AsnThrGluArgIleTyrLeuGluSerLysGlnAlaArgLysIleGlnLysThrLeuAspSerGluPheSerA
laArgGlnAspGluLeuGlnLysLeuGlnArgGluGlyLeuAspLeuGluArgGlnLeuAlaGluGlyLysLeuAr
gAsnAlaLysLysAlaGlnAlaGluGluLysTrpArg-94
100-PheArgLysLysGlnAlaGlnPheGluGluAspTyrAsnLeuArgArgAsnGluGluPheAla-120
123-GlnGlnAsnAlaAsnArgVal-129
133-IleAlaLysGlnGluGlyTyrAspVal-141
152-GlnTyrAspValThrAspSerValIleLysGluMetAsnAlaArg-166

Hydrophilic Regions - Hopp-Woods
37-IleTyrLeuGluSerLysGlnAlaArgLysIleGlnLysThrLeuAspSerGluPheSerAlaArgGlnAspG
luLeuGlnLysLeuGlnArgGluGlyLeuAspLeuGluArgGlnLeuAlaGluGlyLysLeuArgAsnAlaLysLy
sAlaGlnAlaGluGluLysTrpArg-94

100-PheArgLysLysGlnAlaGlnPheGluGluAspTyrAsnLeuArgArgAsnGluGluPheAla-120
133-IleAlaLysGlnGluGlyTyr-139
154-AspValThrAspSerValIleLysGluMetAsnAlaArg-166
571
AMPHI Regions - AMPHI
6-AlaValAsnValLeu-10
40-AspGlyAlaArgValPheArgAlaGly-48
63-AlaAlaValAlaAspPhePheAlaVal-71
94-ValGluValPheLysGlu-99

Antigenic Index - Jameson-Wolf
13-AlaAlaGlyArgGlyThr-18
35-LysGlnAlaGlnAlaAspGlyAlaArgValPheArgAlaGlyHisArgGluGluGlnLeuGlyGlyAspVal-58
76-PheArgThrGluArgAlaAla-82
96-ValPheLysGluGlyAspPhe-102
110-ArgAsnAlaAspPheAlaAlaGluHisGlnArGluGlyPheAlaGlnGlyGluGluProGlyLeu-131
142-AlaAlaArgGlnGlyAspPheGlyVal-150
155-ValAlaAlaArgArgPro-160

Hydrophilic Regions - Hopp-Woods
13-AlaAlaGlyArgGly-17
35-LysGlnAlaGlnAlaAspGlyAlaArgValPheArgAlaGlyHisArgGluGluGlnLeuGly-55
76-PheArgThrGluArgAlaAla-82
96-ValPheLysGluGlyAspPhe-102
110-ArgAsnAlaAspPheAlaAlaGluHisGlnArgGluGlyPheAlaGlnGlyGluGluProGly-130
155-ValAlaAlaArgArgPro-160
572-2
AMPHI Regions - AMPHI
20-LeuAspValValSerArgHisProGluLysPheArgVal-32
39-LysGlnValGluLysLeuAlaAlaGlnCys-48
85-GlnAlaLeuValAspValAlaSerAlaAspGlu-95
101-CysAlaIleValGlyAlaValGlyLeuProSerAlaLeuAla-114
160-GlnValLeuProArgAspTyrAlaGlyArg-169
192-LeuAsnThrPheAspArgIleThrProAlaGlnAlaValLys-205
225-LysGlyLeuGluLeu-229
253-IleHisSerMetValArg-258
282-GlyLeuProGluArgIleAspSerGly-290
299-LeuSerAlaLeuThr-303
340-ValAlaAlaPheLeu-344
350-PheThrAspIleAlaLysThrValAlaHisCysLeuAlaGlnAspPheSerAspGlyIleGlyAspIleGly Gly-374

Antigenic Index - Jameson-Wolf
11-SerThrGlySerIleGlyGluSerThrLeu-20
22-ValValSerArgHisProGluLysPheArg-31
39-LysGlnValGluLysLeuAla-45
59-AlaAspAlaGluHisAlaAlaArgLeu-67
69-AlaLeuLeuLysArgAspGlyThrAla-77
91-AlaSerAlaAspGluValSer-97
117-GlnLysGlyLysThr-121
125-AlaAsnLysGluThrLeu-130
140-ThrAlaArgAlaAsnGly-145
150-ProValAspSerGluHis-155
162-LeuProArgAspTyrAlaGlyArgLeuAsnGluHisGly-174

193-AsnThrPheAspArgIleThrProAlaGlnAlaValLysHisProAsnTrpArgMetGlyArgLysIleSer
ValAspSer-219
224-AsnLysGlyLeuGluLeu-229
237-AsnCysProProAspLysLeuGluVal-245
257-ValArgTyrArgAspGlySerVal-264
269-GlyAsnProAspMetArgThr-275
283-LeuProGluArgIleAspSerGlyValGlyAspLeuAspPhe-296
303-ThrPheGlnLysProAspPheAspArg-311
363-GlnAspPheSerAspGlyIleGlyAspIleGly-373
378-GlnAspAlaArgThrArgAlaGlnAla-386

Hydrophilic Regions - Hopp-Woods
22-ValValSerArgHisProGluLysPheArg-31
39-LysGlnValGluLysLeuAla-45
59-AlaAspAlaGluHisAlaAlaArgLeu-67
69-AlaLeuLeuLysArgAspGlyThrAla-77
91-AlaSerAlaAspGluValSer-97
126-AsnLysGluThrLeu-130
140-ThrAlaArgAlaAsnGly-145
151-ValAspSerGluHis-155
165-AspTyrAlaGlyArgLeuAsnGlu-172
196-AspArgIleThrPro-200
210-ArgMetGlyArgLysIleSerVal-217
225-LysGlyLeuGluLeu-229
239-ProProAspLysLeuGlu-244
257-ValArgTyrArgAspGlySer-263
269-GlyAsnProAspMetArgThr-275
283-LeuProGluArgIleAspSerGlyValGlyAspLeuAspPhe-296
305-GlnLysProAspPheAspArg-311
364-AspPheSerAspGlyIleGly-370
378-GlnAspAlaArgThrArgAlaGlnAla-386
574
AMPHI Regions - AMPHI
6-ProAsnSerLeuLysLys-11
47-LeuLysGlnAlaLysSerIleProSerGlyPheTyrLysSerLeuAspAlaLeuValAspArgAsnSerGlyA
rgAlaAlaArgGluLeuAlaGluValValAsp-81
94-GlyLysLeuTyrArgGln-99
113-MetLeuAspSerProAspThr-119
175-GluLysAlaValGluThrAlaArgLeu-183
218-AsnValGlyLysAlaLeuGluAlaAsnLysLysCys-229
246-PheProAlaAlaValGluAlaTyrAlaAlaIleGlu-257
266-MetValGlyGluLysLeuTyrGluAlaTyrAla-276
281-ProGluGluGlyLeuAsnArgLeuThrGlyTyrMetGlnThrPheProGluLeuAspLeu-300
332-AsnGlyValTyrArg-336
357-ArgSerValIleGlyArgGlnLeuGlnArgSer-367

Antigenic Index - Jameson-Wolf
1-MetArgProAsnLeuProAsnSerLeuLysLysAlaAspMetAspAsn-16
45-ThrValLeuLysGlnAlaLysSerIleProSerGlyPheTyrLysSerLeuAspAlaLeuValAspArgAsnS
erGlyArgAlaAlaArgGluLeuAlaGluValValAspGlyArgProGlnSerTyrAsp-88
96-LeuTyrArgGlnArgGlyGluAsnAspLysAlaIleAsnIleHisArgThrMetLeuAspSerProAspThrV
alGlyGluLysArgAlaArgVal-127
135-TyrGlnSerAlaGlyLeuValAspArgAlaGlu-145
151-LeuGlnAspGlyLysMetAlaArgGluAlaArgGln-162
168-TyrGlnGlnAspArgAspTrpGluLysAlaValGluThr-180

182-ArgLeuLeuSerHisAspAspGlnThrTyr-191
221-LysAlaLeuGluAlaAsnLysLysCysThrArg-231
238-AspIleGluHisArgGlnGlyAsn-245
277-AlaGlnGlyLysProGluGluGlyLeuAsnArgLeuThrGlyTyr-291
312-LysCysGluLysGluAlaAla-318
323-GluLeuValArgArgLysProAspLeuAsnGly-333
341-LysLeuSerAspMetAsnProAlaTrpLysAlaAspAlaAspMetMetArg-357
368-ValMetTyrArgCysArgAsnCysHisPheLys-378
386-CysProAlaCysAsnLysTrpGlnThrPheThrProAsnLysIleGluVal-402

Hydrophilic Regions - Hopp-Woods
1-MetArgProAsnLeu-5
7-AsnSerLeuLysLysAlaAspMetAspAsn-16
45-ThrValLeuLysGlnAlaLysSerIle-53
62-AspAlaLeuValAspArgAsnSerGlyArgAlaAlaArgGluLeuAlaGluValValAspGlyArgProGlnS
er-86
96-LeuTyrArgGlnArgGlyGluAsnAspLysAlaIleAsn-108
112-ThrMetLeuAspSerProAspThrValGlyGluLysArgAlaArgVal-127
140-LeuValAspArgAlaGlu-145
152-GlnAspGlyLysMetAlaArgGluAlaArgGln-162
169-GlnGlnAspArgAspTrpGluLysAlaValGluThr-180
184-LeuSerHisAspAspGlnThrTyr-191
221-LysAlaLeuGluAlaAsnLysLysCysThrArg-231
238-AspIleGluHisArgGlnGlyAsn-245
279-GlyLysProGluGluGlyLeuAsn-286
312-LysCysGluLysGluAlaAla-318
323-GluLeuValArgArgLysProAspLeu-331
349-TrpLysAlaAspAlaAspMetMetArg-357
368-ValMetTyrArgCysArgAsnCysHis-376
398-AsnLysIleGluVal-402
575
AMPHI Regions - AMPHI
8-PheArgLysProAlaSer-13
20-PheAlaGluAlaVal-24
42-SerThrValSerGlyLeuPheSerAla-50
114-LeuSerLysSerLysSer-119
139-SerSerAspSerPro-143
150-PheThrSerPhePheGly-155
163-ValSerThrSerAlaLysValIleSerMetPro-173
217-SerLysValTyrGluProProAsnArgProSerAsn-228
237-AlaGluThrCysSerThr-242
287-AlaGlyPheSerAlaPheAlaSerGlyAla-296

298-ThrPheAlaSerGlyPheSerThrGly-306

308-SerThrValAlaCys-312
315-GlySerAspGlyMetAspAlaValSerAlaLeu-325

Antigenic Index - Jameson-Wolf

2-ValSerGlyGluGluAlaPheArgLysProAlaSerProGluGlyGluAlaGlyPhe-20
34-GlyArgLeuSerGluLysSerValSer-42
54-ThrAspSerGlySerGlyVal-60
96-SerSerSerCysValSerAlaProAspLysMetProPhe-108

113-ArgLeuSerLysSerLysSerMetArgLeuGluGly-124

134-PheAlaAspAsnSerSerSerAspSerProSerLysAlaSerVal-148
155-GlyAlaGlySerGly-159
173-ProSerSerAlaAlaSerSerArgSerGlySerSerSerGlyThrAspSerSerValArgArgAlaArgLeu
AspTrpAlaArgArgLysSerSerSerArgAlaIle-208
211-AlaProProProAlaSer-216

218-LysValTyrGluProProAsnArgProSerAsnSer-229
232-SerValSerSerSerAlaGluThrCysSerThrGlySerGluThr-246
265-GlyAlaAspSerAlaAlaVal-271
280-GlyThrGlySerGlyArgThrAla-287
303-PheSerThrGlyPhe-307
313-LeuAspGlySerAspGlyMetAsp-320

Hydrophilic Regions - Hopp-Woods

2-ValSerGlyGluGluAlaPheArgLysProAlaSerProGluGlyGluAlaGlyPhe-20
34-GlyArgLeuSerGluLysSerValSer-42
101-SerAlaProAspLysMetPro-107
113-ArgLeuSerLysSerLysSerMetArgLeuGluGly-124

137-AsnSerSerSerAspSerProSerLysAla-146
176-AlaAlaSerSerArgSerGlySerSerSerGlyThrAspSerSerValArgArgAlaArgLeuAspTrpAla
ArgArgLysSerSerSerArgAlaIle-208
218-LysValTyrGluProProAsnArgProSerAsn-228
235-SerSerAlaGluThrCysSerThrGlySerGluThr-246
314-AspGlySerAspGlyMetAsp-320

576-1
AMPHI Regions - AMPHI
31-AlaSerGluProAlaAlaAla-37
46-SerIleGlySerThr-50
63-GlyArgSerLeuLysGlnMetLys-70
82-ThrGluAlaMetGln-86
102-GlnGluValMetMetLysPheLeuGlnGluGlnGlnAlaLysAlaValGluLysHis-120
140-AlaLysAspGlyValLysThrThr-147
199-SerGlnValIleProGlyTrpThrGluGlyVal-209

Antigenic Index - Jameson-Wolf
20-AlaCysGlyLysLysGluAlaAlaPro-28
30-SerAlaSerGluProAlaAla-36
38-SerSerAlaGlnGlyAspThrSerSerIleGly-48
61-AspIleGlyArgSerLeuLysGlnMetLysGluGlnGlyAlaGluIleAspLeu-78
89-TyrAspGlyLysGluIleLysMetThrGluGluGlnAlaGln-102
109-LeuGlnGluGlnGlnAlaLysAlaValGluLysHisLysAlaAspAlaLysAlaAsnLysGluLysGlyGlu
AlaPheLeuLysGluAsnAlaAlaLysAspGlyValLysThrThrAlaSerGlyLeu-151
154-LysIleThrLysGlnGlyGluGlyLysGlnProThrLysAspAspIleVal-170
173-GluTyrGluGlyArgLeuIleAsp-180
183-ValPheAspSerSerLysAlaAsnGlyGly-192
210-GlnLeuLeuLysGluGlyGlyGlu-217
224-SerAsnLeuAlaTyrArgGluGlnGlyAlaGlyAspLysIleGlyProAsnAla-241
253-GlyAlaProGluAsnAlaProAlaLysGlnProAla-264
266-ValAspIleLysLysValAsn-272

Hydrophilic Regions - Hopp-Woods
21-CysGlyLysLysGluAlaAlaPro-28
30-SerAlaSerGluProAlaAla-36
40-AlaGlnGlyAspThrSerSer-46
61-AspIleGlyArgSerLeuLysGlnMetLysGluGlnGlyAlaGluIleAspLeu-78
89-TyrAspGlyLysGluIleLysMetThrGluGluGlnAlaGln-102
112-GlnGlnAlaLysAlaValGluLysHisLysAlaAspAlaLysAlaAsnLysGluLysGlyGluAlaPheLeu
LysGluAsnAlaAlaLysAspGlyValLysThrThrAla-148
155-IleThrLysGlnGlyGluGlyLysGlnProThrLysAspAspIleVal-170
173-GluTyrGluGlyArgLeuIleAsp-180
185-AspSerSerLysAlaAsnGly-191
210-GlnLeuLeuLysGluGlyGlyGlu-217
227-AlaTyrArgGluGlnGlyAlaGlyAspLysIleGlyPro-239
253-GlyAlaProGluAsnAlaProAlaLysGlnProAla-264
266-ValAspIleLysLysValAsn-272
577
AMPHI Regions - AMPHI
8-GlyLysIleValGlyAsn-13
24-AlaAlaSerTyrProLysProCysLysSerPheLysLeuAla-37
62-ThrValIleLysIleIle-67
104-AlaPheValValGlyIleIlePheGlyMetPheAlaLeuPheGlyArg-119
144-GluLeuThrAlaProProAlaGln-151

Antigenic Index - Jameson-Wolf
1-MetGluArgAsnGlyVal-6
14-ArgIleLeuArgMetSerSerGluHisAla-23
26-SerTyrProLysProCysLysSerPheLys-35
88-LeuProGlyGlnLysPheAspLeu-95
121-LeuSerLeuArgGlyGluAsnGlyArgLeuArgAlaGluValLysLysAsnAlaArgLeuThrGlyLysGlu
LeuThrAlaProProAlaGlnAsnAlaProGluSerThrLysGlnPro-160

Hydrophilic Regions - Hopp-Woods
1-MetGluArgAsnGlyVal-6
14-ArgIleLeuArgMetSerSerGluHisAla-23
29-LysProCysLysSerPheLys-35
121-LeuSerLeuArgGlyGluAsnGlyArgLeuArgAlaGluValLysLysAsnAlaArgLeuThrGlyLysGlu
LeuThr-146
152-AsnAlaProGluSerThrLysGlnPro-160
578
AMPHI Regions - AMPHI
10-PheAlaAspPhePheLysAspPheAlaProGlnPheGlyGlyPheGlnAsn-26
34-AspPhePheAlaAlaPheLeuGlyGlyLeuGluGlyAsnMetGlyAsnThrAla-51
71-AsnAlaAspAlaAlaArgPhe-77

Antigenic Index - Jameson-Wolf
2-GlyLysLeuAspIle-6
13-PhePheLysAspPheAlaProGlnPheGlyGly-23
43-LeuGluGlyAsnMetGlyAsnThrAla-51
73-AspAlaAlaArgPheAlaGlu-79
90-GlnAsnIleGlnThrGlyAsnAspPheArgLeuGlnArgGlyGlyValGly-106

Hydrophilic Regions - Hopp-Woods
2-GlyLysLeuAspIle-6
73-AspAlaAlaArgPheAlaGlu-79
96-AsnAspPheArgLeuGlnArg-102

579-1
AMPHI Regions - AMPHI
6-PheAspPheLeuHisLeuIleSerValSerGlyTrpGluHisLeuAlaGlu-22
49-ValAlaValMetArg-53
66-IleSerPheLeuCysAsn-71
115-LeuSerAsnPheAla-119
129-ProPheLysValGlyAspPheIleArgValGlyGlyPheGluGlyTyrValArgGluIleLys-149
258-GlnValValGluAsnLeuArg-264

Antigenic Index - Jameson-Wolf
110-SerLeuLysAspGlnLeuSer-116
128-ArgProPheLysVal-132
136-IleArgValGlyGlyPheGluGlyTyrValArgGluIleLysMet-150
154-SerLeuArgThrThrAspAsnGluGluValValLeu-165
175-IleValAsnArgSerThrLeu-181
198-LeuLysValAlaLysGluAlaValLeu-206
216-ValGlnAsnGluGluArgGlnAla-223
231-GlyAspAsnAlaIle-235
244-AsnGluAlaAspArgTrpThrLeu-251
253-CysAspLeuAsnGluGlnValValGluAsnLeuArgLysValAsn-267
271-ProPheProGlnArgAspIleHis-278

Hydrophilic Regions - Hopp-Woods
110-SerLeuLysAspGlnLeu-115
144-TyrValArgGluIleLysMet-150
155-LeuArgThrThrAspAsnGluGluValVal-164
198-LeuLysValAlaLysGluAlaValLeu-206
216-ValGlnAsnGluGluArgGlnAla-223
244-AsnGluAlaAspArgTrp-249
254-AspLeuAsnGluGlnValValGluAsnLeuArgLysValAsn-267
273-ProGlnArgAspIleHis-278
580
AMPHI Regions - AMPHI
47-ProValSerAlaSerLys-52
54-SerLeuValLysProLeuSerGlnProLeuAla-64

Antigenic Index - Jameson-Wolf
1-MetAspSerProLysValGlyCysGly-9
35-ProPheGlyProThrMetPro-41
48-ValSerAlaSerLys-52
66-AlaArgProGluAlaAlaHis-72
81-ArgProGluAlaLeuAlaAspSerSerValSerProThrHisAlaThrSerGlyGluVal-100

Hydrophilic Regions - Hopp-Woods
1-MetAspSerProLysVal-6
66-AlaArgProGluAlaAlaHis-72
81-ArgProGluAlaLeuAla-86
96-ThrSerGlyGluVal-100
581
AMPHI Regions - AMPHI
43-SerHisPheIleSerLeu-48
56-ArgGluCysPheValGlyPhe-62
76-AlaThrAlaPheGlyArgIleAsnGln-84
91-ValHisGlyPheLeuThrThrPheAlaGlyArgIleAlaAsnProAlaHisCysGlnSerGlnThr-112

Antigenic Index - Jameson-Wolf
8-GlyGlnThrGlyIleGluGlnAsnThrPheCysArgArgGlyPheThrArgValAsnMetGlyGlyAsnThrAs
pVal-33
35-ValGlnAlaAspArgGlyLeuThrSer-43
49-SerLysLeuGluThrGluValArgGluCysPhe-59
100-GlyArgIleAlaAsnProAlaHisCysGlnSerGlnThrAla-113

Hydrophilic Regions - Hopp-Woods
35-ValGlnAlaAspArgGlyLeu-41
49-SerLysLeuGluThrGluValArgGlu-57
582
AMPHI Regions - AMPHI
27-ThrAspAsnValThrArgLeuAla-34
65-ValArgSerSerLeu-69
91-GlyGluThrAlaAspIleTyrThrProLeuSer-101
139-GlySerProThrArg-143
169-IleAlaGluAspLeuPhe-174
246-SerArgSerTrpAsnArgIleTyrAlaMet-255
263-LeuThrValIleProArgValTrpValArgAlaPheAspGlnSer-277
286-IleAlaAspTyrMetGlyTyr-292
334-LeuLysGlyValValArgGlyPheHisGlyTyrGlyGlu-346

Antigenic Index - Jameson-Wolf
26-LeuThrAspAsnValThr-31
34-AlaCysTyrAspArg-38
44-LeuProSerSerAlaGlyGlnGluGlyGlnGluSerLysAla-57
63-GluThrValArgSerSerLeuAspLysGlyGluAla-74
77-ValValGluLysGlyGlyAspAlaLeuProAlaAspSerAlaGlyGluThrAlaAsp-95
105-AspLeuAspLysAsnAspLeuArgGly-113
115-LeuGlyValArgGluHisAsnProMetTyr-124
131-AsnAsnSerProAsnTyrAlaProGlySerProThrArgGlyThrThrValGlnGluLysPheGlyGlnGln
LysArgAlaGluThrLysLeu-161
165-PheLysSerLysIleAlaGluAspLeuPheLysThrArgAla-178
183-GlyTyrThrGlnArgSerAspTrpGlnIleTyrAsnGlnGlyArgLysSerAlaProPheArgAsnThrAsp
TyrLysPro-209
216-ProValLysAlaAspLeuProPheGlyGlyArgLeuArgMet-229
237-GlnSerAsnGlyGlnSerArgProGluSerArgSerTrpAsn-250
273-AlaPheAspGlnSerGlyAspLysAsnAspAsnProAspIleAlaAsp-288
291-GlyTyrGlyAspValLysLeuGlnTyrArgLeuAsnAspArgGlnAsnVal-307
312-ArgTyrAsnProLysThrGlyTyr-319
330-IleLysGlyLysLeuLysGlyValVal-338
342-HisGlyTyrGlyGluSerLeuIleAspTyrAsnHisLysGlnAsnGly-357
365-AsnAspLeuAspGlyIle-370

Hydrophilic Regions - Hopp-Woods
48-AlaGlyGlnGluGlyGlnGluSerLysAla-57
63-GluThrValArgSerSerLeuAspLysGlyGluAla-74
79-GluLysGlyGlyAspAlaLeuProAlaAspSerAlaGlyGluThrAlaAsp-95
105-AspLeuAspLysAsnAspLeuArgGly-113
115-LeuGlyValArgGluHisAsn-121
140-SerProThrArgGlyThrThrValGlnGluLysPheGlyGlnGlnLysArgAlaGluThrLysLeu-161
165-PheLysSerLysIleAlaGluAspLeuPheLysThrArgAla-178
195-GlnGlyArgLysSerAlaProPheArgAsnThrAspTyrLysPro-209
225-GlyArgLeuArgMet-229
239-AsnGlyGlnSerArgProGluSerArgSerTrp-249

274-PheAspGlnSerGlyAspLysAsnAspAsnProAspIleAlaAsp-288
293-GlyAspValLysLeu-297
299-TyrArgLeuAsnAspArgGlnAsn-306
332-GlyLysLeuLysGlyValVal-338
352-AsnHisLysGlnAsn-356
583
AMPHI Regions - AMPHI
11-HisLeuAlaPheCysAlaPheCysGlyIle-20
28-ArgLeuHisAsnArgMetTyrAsnAlaAlaAlaAlaArg-40
58-ValThrAspAlaGln-62
66-SerLysAsnGlyAspLysGlnIle-73
75-AspThrHisProGlnPro-80
117-GlyTyrAlaGlyTyrCysAspGln-124
140-AspAsnGlyGlyAsnHisThrAsp-147
162-GlyTyrGlyGlnCysGlnAsnGlnGlyAla-171

Antigenic Index - Jameson-Wolf
24-ThrAlaGlyAsnArgLeuHisAsnArgMetTyr-34
41-GlyIleGlyArgGlyAsnGlySerGlnGlnGlnPheGlyLysSerGluThrValThrAspAlaGlnArgPheS
erSerLysAsnGlyAspLysGlnIleSerAspThrHisProGlnProCysPheGluGlnThrAlaArgAsnHisAs
nCysAspGlyAsnGlnProAsnGlnArgIleGlyGluArgThrGlnArgIleAlaHisArgArgAlaArgPhe-11
4
117-GlyTyrAlaGlyTyCysAspGlnProAspGlyAsnAsnArgGlnArgAlaGlnArgHisGlyLeuAlaAspA
snGlyGlyAsnHisThrAspLysHisGlyGlnGlnArgProSerLeuArgLeuAspProValGlyTyrGlyGlnCy
sGlnAsnGlnGlyAlaGlnTyrCysGlyAsnGlyGluGlyTyrArgPhe-182
190-AspLeuArgLysLysAspArgProGluLysSerGluLys-202

Hydrophilic Regions - Hopp-Woods
27-AsnArgLeuHisAsn-31
41-GlyIleGlyArgGlyAsnGlySer-48
51-GlnPheGlyLysSerGluThrValThrAspAlaGlnArgPheSerSerLysAsnGlyAspLysGlnIleSerA
spThrHisPro-78
84-GlnThrAlaArgAsnHisAsnCysAspGlyAsnGlnProAsnGlnArgIleGlyGluArgThrGlnArgIleA
laHisArgArgAlaArgPhe-114
123-AspGlnProAspGlyAsnAsnArgGlnArgAlaGlnArg-135
137-GlyLeuAlaAspAsnGlyGlyAsnHisThrAspLysHisGlyGlnGlnArgProSerLeuArgLeuAspPro
-160
178-GluGlyTyrArgPhe-182
190-AspLeuArgLysLysAspArgProGluLysSerGluLys-202
584-2
AMPHI Regions - AMPHI
28-GluPheSerGluSerAlaGly-34
60-AlaGluPheValLysLysPheAsnLysPheIleArgLys-72
115-AspPheAspGluLeuAsnArgPheIleAlaAspIle-126
148-IleAspGlnValSerLysAsp-154
166-LeuAlaGlyValLeuGly-171
186-GlySerHisIleAla-190
196-GlnAlaLysMetLeuArgAlaMet-203

Antigenic Index - Jameson-Wolf
37-ValAlaGlnAspThrMetSer-43
50-AlaGluGlyArgAspLysAsnAlaVal-58
61-GluPheValLysLysPheAsnLysPheIleArgLysSerLysAsnGlySerPheLysThrGluLeuValSerA
rgSerAlaMetProArgTyrGlnTyrThrAsnGlyArgArgIleGlnThrGlyTrpGluGluArgAlaGluPheLy
sValGluGlyArgAspPheAspGluLeuAsn-120

138-HisValSerArgGluArgArgAsnGluValIleAspGlnValSerLysAspAlaValLeu-157
159-PheLysAlaArgAlaGluLysLeuAla-167
189-IleAlaGlyGlyGly-193
210-AsnMetGluGlyAlaAspSerAlaAlaProGlyValGluGluIleSer-225

Hydrophilic Regions - Hopp-Woods
50-AlaGluGlyArgAspLysAsnAlaVal-58
61-GluPheValLysLysPheAsnLysPheIleArgLysSerLysAsnGlySerPheLysThrGluLeuValSer-84
95-AsnGlyArgArgIleGlnThrGlyTrpGluGluArgAlaGluPheLysValGluGlyArgAspPheAspGluLeuAsn-120
138-HisValSerArgGluArgArgAsnGluValIleAspGlnValSerLysAspAlaValLeu-157
159-PheLysAlaArgAlaGluLysLeuAla-167
210-AsnMetGluGlyAlaAspSerAlaAlaProGlyValGluGluIleSer-225
585
AMPHI Regions - AMPHI
6-ArgIlePheAlaThrPheCysAlaValIleValCys-17
46-ThrThrLeuMetGlySerIleIleSer-54
65-ArgGluIleLeuThrGluTrpLysAsp-73
93-AsnArgTyrIleAsp-97
133-LysAspTrpAspLysLeuGlnAlaArgArg-142
153-ProLeuAlaProIleTrp-158
178-LeuAlaGlyAsnIleAlaLysProIleArgIleLeuGlyAsnGlyMetAspArgValAla-197
223-PheAspLysMetValGluLysLeuGluLysLeuVal-234
247-GluMetArgSerPro-251
255-MetGlnAlaIleValGlyLeuIle-262
273-LeuLysArgLeuGluGly-278
353-LeuTyrArgAlaPheAspAsnValIleArgAsnAlaValAsn-366
430-IleIleGluGlnHisCysGlyLysIleIleAlaGlu-441

Antigenic Index - Jameson-Wolf
36-AsnGlnPheAsnGlnArgArgThrIleGlu-45
56-PheArgAlaArgGlyAspAlaGlyAlaArgGluIleLeuThrGluTrpLysAspSerProValSer-77
84-GlnGlyAspGluLysLysAspIleLeu-92
99-TyrThrIleGluArgAlaArgLeu-106
120-GluTyrAspArgPheGlyGlu-126
133-LysAspTrpAspLysLeuGlnAlaArgArgLeuProSerPro-146
189-LeuGlyAsnGlyMetAspArgValAlaAsnGlyGluLeuGluThrArgIle-205
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207-GlnGlnValAlaAspAspArgAspAspGluLeuSer-217
225-LysMetValGluLysLeuGluLysLeuValAlaLysGluArgHisLeu-240
246-HisGluMetArgSerProLeuAla-253
264-AlaGlnProGlnLysGlnGluGlnTyrLeuLysArgLeuGluGlyGluLeuThrArgMetAspThrLeuAla-287
294-SerArgLeuGluThrSerAsnMetAlaLeuGluLysGluSerLeuLys-309
317-LeuValGluAspAsnGlnSerIleAlaGlnLysAsnGlyGln-330
335-SerAlaAspGlyLysIleProGluAsnThr-344
367-TyrSerProGluGlySerThr-373
377-AsnIleGlyGlnAspHisLysHis-384
388-AspValThrAspAsnGlyProGlyValAspGluMetGln-400
409-TyrArgAlaAspSerSerAlaAsnLysProGlyThrGly-421
432-GluGlnHisCysGlyLysIleIleAlaGluAsnIleLysProAsnGlyLeuArg-449
453-IleLeuProLysLysLysThrGlySerLysThrGluLysSerAlaAsn-468

Hydrophilic Regions - Hopp-Woods
37-GlnPheAsnGlnArgArgThrIleGlu-45
56-PheArgAlaArgGlyAspAlaGlyAlaArgGluIleLeuThrGluTrpLysAspSerProVal-76
84-GlnGlyAspGluLysLysAspIleLeu-92
100-ThrIleGluArgAlaArgLeu-106
120-GluTyrAspArgPheGlyGlu-126
133-LysAspTrpAspLysLeuGlnAlaArgArgLeuPro-144
192-GlyMetAspArgValAlaAsnGlyGluLeuGluThrArgIle-205

207-GlnGlnValAspAspArgAspAspGluLeuSer-217
225-LysMetValGluLysLeuGluLysLeuValAlaLysGluArgHisLeu-240
246-HisGluMetArgSerProLeu-252
265-GlnProGlnLysGlnGluGlnTyrLeuLysArgLeuGluGlyGluLeuThrArgMetAspThrLeuAla-28
7
294-SerArgLeuGluThr-298
302-AlaLeuGluLysGluSerLeuLys-309
317-LeuValGluAspAsnGlnSerIleAlaGlnLysAsnGlyGln-330
336-AlaAspGlyLysIleProGlu-342
389-ValThrAspAsnGlyProGlyValAspGluMetGln-400
410-ArgAlaAspSerSerAlaAsnLysProGlyThr-420

438-IleIleAlaGluAsnIleLys-444

454-LeuProLysLysLysThrGlySerLysThrGluLysSerAlaAsn-468

586
AMPHI Regions - AMPHI
12-AspAsnPheLysTyrPheTrpLysThr-20
30-IleLeuAlaAlaLeuGly-35
56-ValLeuAlaAsnIleValGluLysAlaGlnSerLys-67
80-LeuGlnGlnSerTyrProHisSerIleSer-89
177-SerGlnGluAlaLeuLysAsnTyrGlyGlnAlaLeuGluLysMetProGlnAspSerValGlyArg-198

Antigenic Index - Jameson-Wolf
4-HisLeuGluGluGlnGlnGluLeuAspAsn-13
42-TyrGlnAsnArgLysValSerGlnAsnGlnGluAla-53
60-IleValGluLysAlaGlnSerLysAlaProGlnSerGluIleAsnAlaGluLeuThrLysLeuGlnGln-82
100-ThrGluPheAspAlaGlnArgTyrAspValAlaGluGly-112
118-LeuSerAsnGlnLysAspSerLeu-125
140-GlnGlnLysLysTyrAspAla-146
153-ThrProValGluAlaAspPhe-159
164-MetGluThrLysGlyAspVal-170
173-AlaGlnGlyLysSerGlnGluAlaLeuLysAsnTyrGlyGlnAlaLeuGluLysMetProGlnAspSerVal
GlyArgGluLeuVal-201
204-LysLeuAspSerLeuLys-209

Hydrophilic Regions - Hopp-Woods
4-HisLeuGluGluGlnGlnGluLeuAspAsn-13
43-GlnAsnArgLysValSerGlnAsnGlnGluAla-53
60-IleValGluLysAlaGlnSerLysAlaProGlnSerGluIleAsnAlaGluLeuThrLys-79
100-ThrGluPheAspAlaGlnArgTyrAspValAlaGluGly-112
120-AsnGlnLysAspSerLeu-125
140-GlnGlnLysLysTyrAspAla-146
153-ThrProValGluAlaAspPhe-159

164-MetGluThrLysGlyAspVal-170
174-GlnGlyLysSerGlnGluAlaLeuLys-182
187-AlaLeuGluLysMetProGlnAspSerValGlyArgGluLeuVal-201
204-LysLeuAspSerLeuLys-209
587
AMPHI Regions - AMPHI
6-LeuProAlaLeuProAlaIleLeuProLeuSerThr-17
190-AsnGlySerLysThrLeuSer-196

Antigenic Index - Jameson-Wolf
27-AspIleMetThrAspLysGlyLysTrpLysLeuGluThr-39
44-LeuAsnSerGluAsnAsnArgAlaGluLeu-53
72-GluIleGlnGluAsnGlySerAsnThrAsp-81
95-GlyAsnThrAspIleTyrGlySerGlySer-104
108-HisGluGluArgLysLeuAspGlyAsnSerLysThrArgAsnLysArgMetSerAsp-126
135-PheLeuLysAspAspLysAsnProAla-143
151-ThrValTyrGluLysSerArgAsnLysAlaSerSerGlyLysSer-165
187-TyrArgIleAsnGlySerLysThrLeuSerAspGlyIleArgTyrLysSerGlyAsnTyr-206
217-AlaAsnAspArgIleSerLeuThrGlyGly-226
231-GlyArgGlnProAspArgThrAspGlyLysArgGluSerSerArgAsnThrSerThr-249
273-ValSerGlyGlnSerSerSerGluLeuLysPhe-283

Hydrophilic Regions - Hopp-Woods
27-AspIleMetThrAspLysGlyLysTrpLysLeu-37
47-GluAsnAsnArgAlaGluLeu-53
72-GluIleGlnGluAsnGlySerAsnThr-80
108-HisGluGluArgLysLeuAspGlyAsnSerLysThrArgAsnLysArgMetSerAsp-126
135-PheLeuLysAspAspLysAsnPro-142
151-ThrValTyrGluLysSerArgAsnLysAlaSerSerGly-163
193-LysThrLeuSerAspGlyIleArgTyrLysSer-203
217-AlaAsnAspArgIleSer-222
232-ArgGlnProAspArgThrAspGlyLysArgGluSerSerArgAsnThr-247
277-SerSerSerGluLeuLysPhe-283
588
AMPHI Regions - AMPHI
52-GlnAspGlyArgAsnTyrThrGlySerPhe-61
99-GlyThrPheLysLys-103

Antigenic Index - Jameson-Wolf
25-SerTyrGlnGluProGlyCysThrTyrAspGlyAsnValGlyLysAspGlyLysProAlaGlyLysGlyThrT
rpArgCysGlnAspGlyArgAsnTyrThrGlySerPheLysAsnGlyLysPheAspGlyGlnGly-70
80-IlePheIleGluProPheAsnSerAspSerThrLysPheArg-93
100-ThrPheLysLysGlyLeuAlaHisGlyArgPheThrValSerGlnAsnGlyGluThr-118
124-CysGluAsnGlyMetIleLysGluValLysLeuProLysAsnLys-138

Hydrophilic Regions - Hopp-Woods
36-AsnValGlyLysAspGlyLysProAlaGly-45
47-GlyThrTrpArgCysGlnAspGlyArgAsnTyr-57
61-PheLysAsnGlyLysPheAspGly-68
85-PheAsnSerAspSerThrLysPheArg-93
100-ThrPheLysLysGlyLeuAla-106
124-CysGluAsnGlyMetIleLysGluValLysLeuProLysAsnLys-138
589
AMPHI Regions - AMPHI
18-AlaSerArgIleGluLysValLeu-25

54-ValAlaAspIlAlaLysIleIleGluLys-63
125-SerValValGlnLeuTrpLeuAla-132
150-MetAspValLeuValThrIle-156
193-PheValSerLeuGlyLysPheLeuGluHisArg-203
225-ValGlnArgAsnGlyGlu-230
240-GlnIleGlyAspLeuIleArg-246
307-GlnThrGlnLeuGlyAspMetMetAsnAlaLeuSerGluAlaGln-321
325-AlaProIleAlaArgValAlaAspLys-333
391-MetGlyLysAlaVal-395
466-IleValSerAlaAlaGln-471
477-IleProAlaAlaGln-481
497-GlyValGlyLeuValLys-502
511-LeuAlaLeuProLysPheLeuAspGlyValTrpAspIleAlaSerIle-526
539-PheAlaLeuAlaAspAlaLeuLys-546
548-AspThrAlaGluAlaIleGlyArgLeu-556
598-GluValGlnLysLeuLysAlaAla-605
612-ValGlyAspGlyIleAsnAspAlaPro-620
635-AlaAspValAlaGluHisThr-641
648-GlnHisSerValAsnGlnLeuAlaAsp-656
675-AlaPhePheTyrAsnIleLeu-681

Antigenic Index - Jameson-Wolf
1-MetGlnGlnLysIleArgPheGlnIle-9
17-CysAlaSerArgIleGluLysValLeuAsnLysLysAspPheValGluSer-33
39-AlaSerGluGluAlaGlnValValPheAspAspSerLysThrSerVal-54
59-LysIleIleGluLysThrGlyTyrGlyAlaLysGluLysThrGluAspThrLeuProGlnProGluAlaGluH
is-83
109-GlyArgHisAspTrp-113
143-IleLysGlyGlyLeu-147
200-LeuGluHisArgThrLysLysSerSerLeuAsn-210
223-ValAsnValGlnArgAsnGlyGluTrpLysGlnLeuProIleAspGln-238
248-AsnHisGlyGluArgIleAlaAla-255
257-GlyIleIleGluSerGlySerGlyTrpAlaAspGluSerHisLeuThrGlyGluSerAsnProGluGluLys
LysAlaGlyGly-284
293-ThrGluGlySerVal-297
318-SerGluAlaGlnGlySerLysAlaProIle-327
329-ArgValAlaAspLysAlaAla-335
356-IleLysGlyAspTrp-360
391-MetGlyLysAlaValLys-396
404-AlaAlaAlaMetGluGluAlaAlaHis-412
417-ValLeuAspLysThrGlyThrLeuThrGluGlySerProGln-430
438-ProAspSerGlyPheAspGluAspAlaLeu-447
454-ValGluGlnAsnAla-458
493-AlaGluValGluGly-497
502-LysAlaGlyLysAlaGluPheAla-509
530-SerValAspAsnLysProIleGly-537
543-AspAlaLeuLysAlaAspThrAlaGluAlaIleGlyArgLeuLysLysHisAsnIle-561
567-SerGlyAspAsnGlnGlyThrValGluTyrValAla-578
588-GlyAsnMetSerProArgAspLysAlaAlaGluValGlnLysLeuLysAlaAlaGly-606
612-ValGlyAspGlyIleAsnAspAla-619
631-MetLysGlyGlyAlaAspValAlaGlu-639
710-AsnAlaLeuArgLeuLysArgValLysIleAsp-720

Hydrophilic Regions - Hopp-Woods
1-MetGlnGlnLysIleArgPheGlnIle-9

19-SerArgIleGluLysValLeuAsnLysLysAspPheValGlu-32
39-AlaSerGluGluAlaGlnValValPheAspAspSerLysThrSerVal-54
64-ThrGlyTyrGlyAlaLysGluLysThrGluAspThrLeuProGlnProGluAlaGluHis-83
200-LeuGluHisArgThrLysLysSerSerLeu-209
224-AsnValGlnArgAsnGlyGluTrpLys-232
248-AsnHisGlyGluArgIleAlaAla-255
257-GlyIleIleGluSer-261
265-TrpAlaAspGluSerHisLeuThrGlyGluSerAsnProGluGluLysLysAlaGlyGly-284
318-SerGluAlaGlnGlySerLysAlaProIle-327
329-ArgValAlaAspLysAlaAla-335
404-AlaAlaAlaMetGluGluAlaAlaHis-412
417-ValLeuAspLysThrGlyThrLeuThrGluGlySerPro-429
440-SerGlyPheAspGluAspAlaLeu-447
454-ValGluGlnAsnAla-458
493-AlaGluValGluGly-497
502-LysAlaGlyLysAlaGluPheAla-509
531-ValAspAsnLysPro-535
543-AspAlaLeuLysAlaAspThrAlaGluAlaIleGlyArgLeuLysLysHisAsnIle-561
568-GlyAspAsnGlnGly-572
591-SerProArgAspLysAlaAlaGluValGlnLysLeuLysAlaAlaGly-606
633-GlyGlyAlaAspValAlaGlu-639
712-LeuArgLeuLysArgValLysIleAsp-720
590-1
AMPHI Regions - AMPHI
77-TyrLeuProAspAsnLeuLysThrValLeuGluGlnProValThrLeuValAsnHisIleThrHis-98
100-ProPheAlaGlyGlyPhe-105
123-LysValLeuGluArgPhePheGly-130
132-GlnValProAlaSerLeu-137
177-TyrGlnLysGlyPheLysSerTyrArgAsnGly-187
214-ThrSerAspGlyIleAsnProLeu-221
248-AsnGluLeuValAsnLeuVal-254
331-LysArgLysPheAla-335
420-LysMetLeuGluAsp-424
450-AspIleAsnGluThrLeuArgLeuMet-458
460-AspSerThrValGln-464

Antigenic Index - Jameson-Wolf
1-MetLysLysProLeu-5
26-LysAlaGluGluSerLeuThrGlnGlnGlnLysIleLeuGln-39
47-GluSerHisGlnTyrGluArgGlyTrp-55
62-ThrValIleArgLeuLysProGluLeu-70
72-AsnAsnAlaArgLysTyrLeuProAspAsnLeuLysThrValLeu-86
113-ThrGluPheLysTyrAlaProGluThrGluLysValLeuGlu-126
128-PhePheGlyLysGlnValPro-134
144-AsnGlySerGlyLysMetGluVal-151
157-AspTyrGluGluLeuSerGly-163
175-ThrValTyrGlnLysGlyPheLysSerTyrArgAsnGlyTyrAspAlaPro-191
196-LysLeuAlaAspLysGlyAspAlaAlaPheGlu-206
208-ValHisPheAspSerGluThrSerAspGlyIleAsn-219
233-PheSerLeuGluTrpLysGluGlyValAspTyr-243
264-AsnProAsnGlySerIleAlaProSerLysIleGluValGly-277
281-PheSerThrLysThrGlyGluSerGlyAla-290
292-IleAsnSerGluGlyGlnPheArgPheAspThr-302
304-ValTyrGlyAspGluLysTyrGlyPro-312
330-LeuLysArgLysPheAla-335

338-SerAlaLysLysMetThrGluGluGlnIleArgAsnAspLeu-351
355-ValLysGlyGluAlaSerGlyLeuPheThrAsnAsnProValLeuAsp-370
378-LeuProSerGlyLysIleAspValGlyGly-387
389-IleMetPheLysAspMetLysLysGluAspLeuAsnGln-401
406-LeuLysLysThrGluAlaAspIleArgMet-415
437-AsnAlaGluAspGluAlaGluGlyArgAlaSerLeuAspAspIleAsnGluThrLeu-455
466-MetAlaArgGluLysTyr-471
475-AsnGlyAspGlnIleAsp-480
485-LeuLysAsnAsnGlnLeuLysLeuAsnGlyLysThrLeuGlnAsnGluProGluProAspPheAspGluGly
GlyMetValSerGluProGlnGln-516

Hydrophilic Regions - Hopp-Woods
1-MetLysLysProLeu-5
26-LysAlaGluGluSerLeuThrGln-33
62-ThrValIleArgLeuLysProGluLeu-70
72-AsnAsnAlaArgLysTyrLeuProAspAsnLeuLysThrValLeu-86
113-ThrGluPheLysTyrAlaProGluThrGluLysValLeuGlu-126
147-GlyLysMetGluVal-151
157-AspTyrGluGluLeuSerGly-163
180-GlyPheLysSerTyrArgAsnGlyTyr-188
196-LysLeuAlaAspLysGlyAspAlaAlaPheGlu-206
208-ValHisPheAspSerGluThrSerAspGly-217
233-PheSerLeuGluTrpLysGluGlyValAspTyr-243
272-SerLysIleGluValGly-277
306-GlyAspGluLysTyrGlyPro-312
330-LeuLysArgLysPheAla-335
338-SerAlaLysLysMetThrGluGluGlnIleArgAsnAspLeu-351
355-ValLysGlyGluAla-359
381-GlyLysIleAspValGlyGly-387
389-IleMetPheLysAspMetLysLysGluAspLeuAsn-400
406-LeuLysLysThrGluAlaAspIleArgMet-415
437-AsnAlaGluAspGluAlaGluGlyArgAlaSerLeuAspAspIleAsnGluThrLeu-455
466-MetAlaArgGluLysTyr-471
486-LysAsnAsnGlnLeuLysLeuAsnGly-494
496-ThrLeuGlnAsnGluProGluProAspPheAspGluGlyGlyMetValSerGluProGlnGln-516
591
AMPHI Regions - AMPHI
6-AlaPheIlePheAla-10
17-LeuHisGluPheGlyHisTyrIleValAla-26
61-LeuGlyGlyTyrValLysMetValAsp-69
143-GlyAspLysIleGlnSerValAsnGlyThrProValAlaAspTrp-157
181-SerGlyAlaGlnThrValArgThrIleAspAlaAlaGlyThrProGluAlaGlyLysIleAlaLys-202
218-AlaGlyGlyValGluLys-223
234-ProGlyAspArgLeu-238
245-ProIleAlaSerTrpGlnGluTrpAlaAsnLeuThrArg-257
270-ArgAlaGlyGlnThr-274
304-AlaTrpAspAlaGlnIleArg-310
313-TyrArgProSerValValArgAlaPheGly-322

324-GlyTrpGluLysThrValSerHis-331
335-ThrLeuLysPhePheGlyLysLeuIle-343
351-HisIleSerGlyProLeuThrIleAla-359

373-TyrLeuGluPheLeuAlaLeu-379

Antigenic Index - Jameson-Wolf
44-PhePheThrArgLysArgGlyAspThrGlu-53
68-ValAspThrArgGluGlyGluValSerGluAlaAspLeu-80
84-PheAspLysGlnHisProAlaLysArg-92
129-ValGluProAspThrIleAla-135
139-GlyPheGlnSerGlyAspLysIleGlnSer-148
157-TrpGlySerAlaGln-161
187-ArgThrIleAspAlaAlaGlyThrProGluAlaGlyLysIleLysAsnGlnGly-205
219-GlyGlyValGluLysGlySerProAlaGluLysAlaGlyLeuLysProGlyAspArgLeuThrAlaAlaAsp
GlyLysProIle-246
254-AsnLeuThrArgGlnSerProGlyLysLysIle-264
267-AsnTyrGluArgAlaGlyGlnThrHis-275
277-AlaAspIleArgProAspThrValGluGlnSerAspHis-289
295-ValGlyLeuArgProGlnProAspArgAlaTrp-305
307-AlaGlnIleArgArgSerTyrArgProSerVal-317
327-LysThrValSerHisSer-332
343-IleSerGlyAsnAla-347
362-AlaGlyGlnSerAla-366
408-IleArgGlyLysProLeuGlyGluArgValGln-418

Hydrophilic Regions - Hopp-Woods
44-PhePheThrArgLysArgGlyAspThr-52
68-ValAspThrArgGluGlyGluValSerGluAlaAspLeu-80
84-PheAspLysGlnHisProAlaLysArg-92
129-ValGluProAspThrIleAla-135
139-GlyPheGlnSerGlyAspLysIleGlnSer-148
193-GlyThrProGluAlaGlyLysIleAlaLys-202
220-GlyValGluLysGlySerProAlaGluLysAlaGlyLeuLysProGlyAspArgLeuThrAlaAlaAspGly
LysPro-245
256-ThrArgGlnSerProGlyLysLysIle-264
268-TyrGluArgAlaGlyGln-273

277-AlaAspIleArgProAspThrValGluGlnSerAsp-288
299-ProGlnProAspArgAlaTrp-305
308-GlnIleArgArgSerTyrArg-314
362-AlaGlyGlnSerAla-366
411-LysProLeuGlyGluArgValGln-418
592
AMPHI Regions - AMPHI
6-PheGlyGlnIlePheSer-11
21-GlyGlyLeuLeuGlyGlyLeuIle-28
50-AlaProAsnAlaAlaAlaAlaAla-57
65-GlnGlyMetIleGlnMetLeuGlyValPheValAsp-76
94-ProTyrGlyAspLeu-98
109-ValSerGlnValGlyGlnTrp-115
153-ThrAlaValPheArgMet-158
165-TyrPheGlyAlaValAla-170
185-IleMetAlaTrpIleAsnLeuValAlaIleLeuLeuLeuSer-198

Antigenic Index - Jameson-Wolf
35-GlyIleLysArgGlyLeuTyrSerAsnGluAlaGlyMetGlySerAlaProAsnAla-53
57-AlaGluValLysHisProVal-63
93-GlnProTyrGlyAspLeuSerGly-100
137-AlaTyrAlaGluSerAsnVal-143

206-ArgAspTyrThrAlaLysLeuLysMetGlyLysAspProGluPheLysLeuSerGluHisProGlyLeuLys
ArgArgIleLysSerAspValTrp-237

Hydrophilic Regions - Hopp-Woods
35-GlyIleLysArgGlyLeuTyr-41
57-AlaGluValLysHis-61
212-LeuLysMetGlyLysAspProGluPheLysLeuSerGlu-224
226-ProGlyLeuLysArgArgIleLysSer-234
593
AMPHI Regions - AMPHI
6-GlyLeuCysLysArgPheGlyAsnLysThr-15
41-SerThrLeuLeuAsnIleIleAlaGlyIle-50
87-HisMetSerAlaLeuGlu-92
125-AlaHisArgLysProGluLysLeuSerGlyGlyGlu-136
159-PheSerSerLeuAsp-163
165-HisLeuArgGlyThrLeuArg-171
216-ProGluThrLeuValLysThrProSerCysValGlnValAlaArgLeuMetGlyLeu-234

Antigenic Index - Jameson-Wolf
6-GlyLeuCysLysArgPheGlyAsnLysThrValAla-17
24-ValGlyArgGlyLysIle-29
33-LeuGlyArgSerGlyCysGlyLysSerThr-42
50-IleValArgProAspGlyGlyGlu-57
61-AsnGlyGluAsnIleThrArgMetProProGluLysArgArgIle-75
99-LysMetGlnLysMetProLysAlaGluAlaGluArgLeuAla-112
119-ValGlyLeuGluAsnGluAlaHisArgLysProGluLysLeuSerGlyGlyGluLysGlnArgLeuAlaLeu
-142
157-GluSerPheSerSerLeu-162
168-GlyThrLeuArgArgMetThrAlaGluArgIleArgAsnGlyGlyIle-183
190-HisSerProGluGluAlaCysThrThrAlaAspGluIleAlaVal-204
206-HisLysGlyArgIle-210
214-GlyThrProGluThrLeuValLysThrProSer-224
233-GlyLeuProAsnThrAspAspAsnArgHisIle-243
248-ValArgPheAspGlnAspGlyMetGluCysArgValLeuSer-261
263-ThrCysLeuProGluSer-268
291-GlyAlaValSerGlyLysAspThrVal-299
302-HisIleGluGluArgGluIleValArgPheArg-312

Hydrophilic Regions - Hopp-Woods
6-GlyLeuCysLysArgPheGlyAsn-13
25-GlyArgGlyLysIle-29
36-SerGlyCysGlyLys-40
51-ValArgProAspGlyGly-56
68-MetProProGluLysArgArgIle-75
99-LysMetGlnLysMetProLysAlaGluAlaGluArgLeuAla-112
119-ValGlyLeuGluAsnGluAlaHisArgLysProGluLysLeuSerGlyGlyGluLysGlnArgLeuAlaLeu
-142
168-GlyThrLeuArgArgMetThrAlaGluArgIleArgAsn-180
191-SerProGluGluAlaCysThrThrAlaAspGluIleAlaVal-204
206-HisLysGlyArgIle-210
236-AsnThrAspAspAsnArgHisIle-243
248-ValArgPheAspGlnAspGlyMetGluCysArgValLeuSer-261
293-ValSerGlyLysAspThrVal-299
302-HisIleGluGluArgGluIleValArgPheArg-312
594

AMPHI Regions - AMPHI
21-SerIleLeuArgLeu-25
108-AlaGlyArgGluCysGlnGluThrAlaAlaAla-118
138-AlaIleLysArgCysAsn-143

Antigenic Index - Jameson-Wolf
1-MetGlyAlaAspThrAspGlyAspLysAspValArgLeuAsnArgThr-16
51-ValGluHisProAsnArgPhe-57
75-HisLeuAspGlySerThrGlyGly-82
86-PheArgArgGluLysThrGlyHisLysArgArgCysHisThrGlnCys-101
103-HisSerAlaArgAlaAlaGlyArgGluCysGlnGluThr-115
137-ArgAlaIleLysArgCysAsn-143

Hydrophilic Regions - Hopp-Woods
1-MetGlyAlaAspThrAspGlyAspLysAspValArgLeuAsnArg-15
86-PheArgArgGluLysThrGlyHisLysArgArgCysHis-98
105-AlaArgAlaAlaGlyArgGluCysGlnGluThr-115
137-ArgAlaIleLysArgCysAsn-143
595
AMPHI Regions - AMPHI
20-CysGlnProProGluAla-25
140-AlaAspLeuGluLysLeuSerGlnProLeuAla-150
157-GlnGlyGluValLysGluLeuVal-164
169-ThrPheThrGluAlaValLysAlaGlyAspIleGluLysAla-182
196-IleGluProIleAlaGluLeuPheSerGluLeuAspPro-208
224-AlaGlyPheThrGlyPheHisArg-231
243-SerGlyValLysGluIleAlaAlaLysLeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264
274-ValGlyGlyAlaSerGluLeuIleGluGluValAlaGly-286
309-AspGlySerLysLysIleValAspLeuPheArgProLeu-321
337-PheLysGlnValAsnGluIleLeuAlaLys-346
351-AspGlyPheGluThrTyrAspLysLeuGlyGlu-361
366-AlaLeuGlnAlaSerIleAsnAlaLeuAlaGluAspLeuAlaGlnLeuArgGlyIleLeuGlyLeu-387

Antigenic Index - Jameson-Wolf

1-MetArgLysPheAsn-5
21-GlnProProGluAlaGluLysAlaAlaPro-30
"

"

32-AlaSerGlyGluAlaGlnThrAlaAsnGluGlyGlySer-44
50-AsnAspAsnAlaCysGluProMetGlu-58
70-IleLysAsnAsnSerGlyArgLysLeuGluTrpGluIle-82
87-MetValValAspGluArgGluAsnIleAla-96
"

"

98-GlyLeuSerAspLysMetThr-104
108-LeuProGlyGluTyrGluMet-114
120-ThrAsnProArgGlyLysLeuValValThrAspSerGlyPheLysAspThrAlaAsnGluAlaAspLeuGlu
LysLeuSer-146
"

"

158-GlyGluValLysGluLeuValAlaLysThrLysThrPheThrGluAlaValLysAlaGlyAspIleGluLys
AlaLysSerLeuPheAla-187
189-ThrArgValHisTyrGluArgIleGluProIle-199
204-SerGluLeuAspProValIleAspAlaArgGluAspAspPheLysAspGlyAlaLysAspAlaGly-225
238-ValGluLysAspValSerGlyValLysGluIleAlaAla-250
252-LeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264
269-ProProGlyLysValValGlyGlyAla-277
"

"

279-GluLeuIleGluGluValAlaGlySerLysIleSerGlyGluGluAspArgTyrSerHisThrAspLeuSer
AspPheGlnAlaAsnValAspGlySerLysLysIleValAsp-316
322-IleGluAlaLysAsnLysAlaLeuLeuGluLysThrAspThrAsnPheLysGlnValAsn-341
345-AlaLysTyrArgThrLysAspGlyPheGluThrTyrAspLysLeuGlyGluAlaAspArgLysAlaLeu-36
7
374-LeuAlaGluAspLeuAlaGln-380

Hydrophilic Regions - Hopp-Woods

"

1-MetArgLysPheAsn-5
21-GlnProProGluAlaGluLysAlaAlaPro-30
"

"

32-AlaSerGlyGluAlaGlnThrAlaAsnGluGlyGlySer-44
52-AsnAlaCysGluProMetGlu-58
72-AsnAsnSerGlyArgLysLeuGluTrpGluIle-82
87-MetValValAspGluArgGluAsnIle-95
99-LeuSerAspLysMetThr-104
110-GlyGluTyrGluMet-114
122-ProArgGlyLysLeuValVal-128
"

"

131-SerGlyPheLysAspThrAlaAsnGluAlaAspLeuGluLysLeuSer-146
158-GlyGluValLysGluLeuValAlaLysThrLysThrPheThrGluAlaValLysAlaGlyAspIleGluLys
AlaLysSerLeuPheAla-187
"

"

189-ThrArgValHisTyrGluArgIleGluProIle-199
204-SerGluLeuAspProValIleAspAlaArgGluAspAspPheLysAspGlyAlaLysAspAlaGly-225
"

"

238-ValGluLysAspValSerGlyValLysGluIleAlaAla-250
252-LeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264
279-GluLeuIleGluGluValAlaGly-286
"

"

288-LysIleSerGlyGluGluAspArgTyrSerHis-298
"

"
308-ValAspGlySerLysLysIleValAsp-316
322-IleGluAlaLysAsnLysAlaLeuLeuGluLysThrAspThrAsnPhe-337
347-TyrArgThrLysAspGlyPheGluThrTyrAspLysLeuGlyGluAlaAspArgLysAlaLeu-367
374-LeuAlaGluAspLeuAlaGln-380
596
AMPHI Regions - AMPHI
9-MetLeuArgValSerLysValVal-16
50-LeuArgIleMetAlaGlyValAspLys-58
87-ValArgGluGluValGluSerGlyLeuGlyGluValAlaAlaAlaGlnLysArgLeuGluGluValTyrAlaG
luTyr-112
192-ProThrAsnHisLeuAsp-197
202-GluTrpLeuGluGlnPheLeuValArgPheProGly-213
295-AlaArgPheGluGluMetSerAsnTyr-303
322-LeuGlyAsnGluValIleGluPheValAsnValSerLysSerPhe-336
366-SerThrLeuPheLysMet-371
409-AspAsnIleAlaGlu-413
440-AspGlnSerLysIleAlaGlyGlnLeuSerGlyGlyGlu-452
483-LeuArgAlaLeuGluAspAlaLeuLeuGluPheAla-494

Antigenic Index - Jameson-Wolf
16-ValProProGlnLysThrIleIleLysAspIleSer-27
41-LeuAsnGlyAlaGlyLysSerThrVal-49
54-AlaGlyValAspLysGluPheGluGlyGluAla-64
75-LeuProGlnGluProGluLeuAspProGluLysThrValArgGluGluValGluSerGlyLeu-95
99-AlaAlaAlaGlnLysArgLeuGluGluValTyr-109
112-TyrAlaAsnProAspAlaAspPheAspAlaLeuAlaGluGluGlnGlyArgLeuGlu-130
136-GlySerSerThrGlyGlyGlyAlaGluHisGluLeuGluIleAlaAlaAspAlaLeuArg-155
157-ProGluTrpAspAlaLysIleAspAsnLeuSerGlyGlyGluLysArgArgValAla-175
181-LeuSerLysProAspMet-186
190-AspGluProThrAsnHisLeuAspAlaGluSer-200
219-ThrHisAspArgTyrPhe-224
233-LeuGluLeuAspArgGlyHisGlyIle-241
243-TrpLysGlyAsnTyrSerSer-249
251-LeuGluGlnLysGluLysArgLeuGluAsnGluAlaLysSerGluAlaAlaArgValLysAlaMetLysGln
GluLeuGluTrp-278
280-ArgGlnAsnAlaLysGlyArgGlnAlaLysSerLysAlaArgLeuAlaArgPheGluGluMetSerAsnTyr
GluTyrGlnLysArgAsnGluThrGlnGlu-313
319-AlaGluArgLeuGlyAsnGluVal-326
333-SerLysSerPheGlyAsp-338
360-ProAsnGlyAlaGlyLysSerThrLeu-368
372-IleSerGlyLysGluGlnProAspSerGlyGluValLysIle-385
395-AspGlnSerArgGluGlyLeuGlnAsnAspLysThrVal-407
411-IleAlaGluGlyArgAspIleLeu-418
425-IleProAlaArgGlnTyrLeuGlyArgPheAsnPheLysGlySerAspGlnSerLysIleAla-445
447-GlnLeuSerGlyGlyGluArgGlyArgLeuHisLeu-458
471-LeuAspGluProSerAsnAspLeuAspValGluThr-482
501-SerHisAspArgTrpPhe-506
516-AlaCysGluGlyAspSerLysTrp-523
527-AspGlyAsnTyrGlnGluTyrGluAlaAspLysLysArgArgLeuGlyGluGluGlyAlaLysProLysArg
IleLysTyrLysProValThrArg-558

Hydrophilic Regions - Hopp-Woods
54-AlaGlyValAspLysGluPheGluGlyGluAla-64

77-GlnGluProGluLeuAspProGluLysThrValArgGluGluValGluSerGlyLeu-95
99-AlaAlaAlaGlnLysArgLeuGluGluValTyr-109
113-AlaAsnProAspAlaAspPheAspAlaLeuAlaGluGluGlnGlyArgLeuGlu-130
141-GlyGlyAlaGluHisGluLeuGluIleAlaAlaAspAlaLeuArg-155
157-ProGluTrpAspAlaLysIleAspAsn-165
167-SerGlyGlyGluLysArgArgValAla-175
181-LeuSerLysProAsp-185
190-AspGluProThrAsn-194
196-LeuAspAlaGluSer-200
233-LeuGluLeuAspArgGlyHis-239
251-LeuGluGlnLysGluLysArgLeuGluAsnGluAlaLysSerGluAlaAlaArgValLysAlaMetLysGln
GluLeuGluTrp-278
280-ArgGlnAsnAlaLysGlyArgGlnAlaLysSerLysAlaArgLeuAlaArgPheGluGluMetSerAsn-30
2
304-GluTyrGlnLysArgAsnGluThrGln-312
319-AlaGluArgLeuGlyAsnGluVal-326
372-IleSerGlyLysGluGlnProAspSerGlyGluValLysIle-385
395-AspGlnSerArgGluGlyLeuGlnAsnAspLysThrVal-407
411-IleAlaGluGlyArgAspIleLeu-418
435-AsnPheLysGlySerAspGlnSerLysIle-444
449-SerGlyGlyGluArgGlyArgLeuHisLeu-458
472-AspGluProSerAsnAspLeuAspValGluThr-482
517-CysGluGlyAspSer-521
529-AsnTyrGlnGluTyrGluAlaAspLysLysArgArgLeuGlyGluGluGlyAlaLysProLysArgIleLys
Tyr-553

597-2

AMPHI Regions - AMPHI
30-AlaGluValLysLys-34
66-LysGluAlaAlaLysGluGlyLysGluSerLysLysThrAlaLys-80
93-GlnSerAlaArgLysGlyArgGluGly-101
112-AlaHisGlyLysPro-116
141-GlnGlyAsnProArgLysGlyGlyLys-149
163-SerAspLysAsnGlyLysAlaValLysGlnAspLysLysTyrArgGluGluLysAsn-181
217-ValSerAsnSerLeuLysGlnLeuGlnGlu-226
252-TrpAspLysPheGlnLysLeu-258
275-GlnIleSerArgPheValSerGly-282
308-LeuArgTyrThrArgTyrValAsnAla-316
318-AsnArgGluValValLysAspLeuGluLysGlnGln-329
339-IleAsnAsnGluLeuAlaArgLeuLysLys-348
351-AlaAsnValGlnSerLeu-356
364-AspAlaAlaGluGlnThrGlu-370
376-AlaLysIleAlaLysAspAlaArg-383
396-AsnLysLeuLeuSer-400
460-ProSerValMetGlyIleGlySerAlaAspGlyPheSerArgMetGlnGlyArgLeuLysLysProValAsp
GlyValProThrGly-488
509-ProAlaThrValGluSerIleAla-516
521-SerTyrAlaAspGluLeuAspGlyTyrGlyLys-531
543-SerIleTyrAlaGlyLeu-548

Antigenic Index - Jameson-Wolf
23-AspAlaAlaHisAsnArgSerAlaGluValLysLysGlnThrLysAsnLysLysGluGlnProGluAlaAlaG
luGlyLysLysGluLysGlyLysAsnGlyAlaValLysAspLysLysThrGlyGlyLysGluAlaAlaLysGluGl
yLysGluSerLysLysThrAlaLysAsnArgLysGluAlaGluLysGluAlaThrSerArgGlnSerAlaArgLys
GlyArgGluGlyAspLysLysSerLysAlaGluHisLysLysAlaHisGlyLysProValSerGlySerLysGluL
ysAsnAlaLysThrGlnProGluAsnLysGlnGlyLysLysGluAlaLysGlyGlnGlyAsnProArgLysGlyGl

yLysAlaGluLysAspThrValSerAlaAsnLysLysValArgSerAspLysAsnGlyLysAlaValLysGlnAsp
LysLysTyrArgGluGluLysAsnAlaLysThrAspSerAspGluLeuLysAla-191
196-AlaThrAsnAspValGluAsnLysLysAlaLeuLeuLysGlnSerGluGly-212
219-AsnSerLeuLysGlnLeuGlnGluGluArgIleArgGlnGluArgIleArgGlnAlaArgGlyAsnLeu-24
1
243-SerValAsnArgLysGlnArgGluAlaTrpAspLysPheGlnLysLeuAsnThrGluLeuAsnArgLeuLys
ThrGluValAlaAla-271
281-SerGlyAsnTyrLysAsnSerGlnProAsn-290
298-AsnAlaGluProGlyGlnLysAsnArgPhe-307
314-ValAsnAlaSerAsnArgGluValValLysAspLeuGluLysGlnGlnLys-330
335-GlnGluGlnLysIleAsnAsnGluLeuAlaArgLeuLysLysIleGln-350
356-LeuLeuLysLysGlnGlyValThrAspAlaAlaGluGlnThrGluSerArgArgGlnAsnAlaLysIleAla
LysAspAlaArgLysLeuLeuGluGlnLysGlyAsnGluGlnGlnLeu-395
398-LeuLeuSerAsnLeuGluLysLysLysAlaGluHisArgIleGlnAspAlaGluAlaLysArgLysLeuAla
GluAlaArgLeuAlaAlaAlaGluLysAlaArgLysGluAlaAlaGlnGlnLysAlaGluAlaArgArgAlaGluM
etSerAsnLeuThrAlaGluAspArgAsnIleGlnAlaProSer-461
466-GlySerAlaAspGlyPheSerArgMetGlnGlyArgLeuLysLysProValAspGlyValProThr-487
491-GlyGlnAsnArgSerGlyGlyAspIle-499
521-SerTyrAlaAspGluLeuAspGlyTyrGly-530
536-AspHisGlyGluAsnTyr-541
561-AlaGlySerLysIleGlySerSerGlySerLeuProAspGlyGluGluGlyLeu-578
588-ValLeuAsnProSerSerTrp-594

Hydrophilic Regions - Hopp-Woods
23-AspAlaAlaHisAsnArgSerAlaGluValLysLysGlnThrLysAsnLysLysGluGlnProGluAlaAlaG
luGlyLysLysGluLysGlyLysAsnGlyAlaValLysAspLysLysThrGlyGlyLysGluAlaAlaLysGluGl
yLysGluSerLysLysThrAlaLysAsnArgLysGluAlaGluLysGluAlaThrSerArgGlnSerAlaArgLys
GlyArgGluGlyAspLysLysSerLysAlaGluHisLysLysAlaHisGlyLysProValSerGlySerLysGluL
ysAsnAlaLysThrGlnProGluAsnLysGlnGlyLysLysGluAlaLysGlyGlnGlyAsnProArgLysGlyGl
yLysAlaGluLysAspThrValSerAlaAsnLysLysValArgSerAspLysAsnGlyLysAlaValLysGlnAsp
LysLysTyrArgGluGluLysAsnAlaLysThrAspSerAspGluLeuLysAla-191
198-AsnAspValGluAsnLysLysAlaLeuLeuLysGlnSerGlu-211
220-SerLeuLysGlnLeuGlnGluGluArgIleArgGlnGluArgIleArgGlnAlaArgGlyAsn-240
244-ValAsnArgLysGlnArgGluAlaTrpAspLysPheGlnLysLeuAsnThrGluLeuAsnArgLeuLysThr
GluValAlaAla-271
284-TyrLysAsnSerGln-288
298-AsnAlaGluProGlyGlnLysAsnArgPhe-307
317-SerAsnArgGluValValLysAspLeuGluLysGlnGlnLys-330
335-GlnGluGlnLysIleAsnAsnGluLeuAlaArgLeuLysLysIleGln-350
356-LeuLeuLysLysGlnGlyValThrAspAlaAlaGluGlnThrGluSerArgArgGlnAsnAlaLysIleAla
LysAspAlaArgLysLeuLeuGluGlnLysGlyAsnGluGlnGlnLeu-395
400-SerAsnLeuGluLysLysLysAlaGluHisArgIleGlnAspAlaGluAlaLysArgLysLeuAlaGluAla
ArgLeuAlaAlaAlaGluLysAlaArgLysGluAlaAlaGlnGlnLysAlaGluAlaArgArgAlaGluMet-447
451-ThrAlaGluAspArgAsnIleGln-458
474-MetGlnGlyArgLeuLysLysProValAsp-483
493-AsnArgSerGlyGlyAspIle-499
522-TyrAlaAspGluLeuAspGlyTyrGly-530
563-SerLysIleGlySer-567
570-SerLeuProAspGlyGluGluGlyLeu-578

601-2
AMPHI Regions - AMPHI
29-AlaAlaArgGluAla-33
43-ArgValLeuGlySerPro-48
50-ProTyrGlyLysGlnIleAspGlyLeuGlyAsnAlaSerSerSer-64

94-PheValAspTrpSerGly-99
101-CysGlyAsnLeuThrAlaAla-107
134-TrpGlnLysAsnIleGlyLysThrIle-142
191-LeuValAspGluIleAspValProAsnIleGlyArg-202
210-AlaGlyIleProThrValPhe-216
226-GlyLysGluLeuGlnAspAspIleAsnAsnAspAlaAlaAlaLeuGluLysPheGluLysIleArgAlaTyr
GlyAlaLeu-252
254-MetGlyLeuIleSerAspValSerGluAlaAla-264
284-SerSerGlyLysThrValAsn-290
321-AlaAlaAlaValProGlyThrLeuValAsnLeuAlaAla-333
353-GlyAlaAlaAlaGlu-357

Antigenic Index - Jameson-Wolf
11-TyrArgGlyGlyThrSerLysGlyValPhePheLysArgSerAspLeuProGluAlaAlaArgGluAlaGlyS
erAlaArgAspLysIleLeu-41
46-GlySerProAspProTyrGlyLysGlnIleAspGlyLeuGlyAsnAlaSerSerSerThrSerLys-67
69-ValIleLeuAspLysSerGluArgAlaAspHisAspValAspTyr-83
89-SerIleAspLysProPhe-94
96-AspTrpSerGlyAsnCysGly-102
116-GlyLeuValAspLysGlyLysIleProSerAspGly-127
134-TrpGlnLysAsnIleGlyLysThrIle-142
155-GluThrGlyAspPheGluLeu-161
177-AspProAlaAspGlyGluGlySerMet-185
187-ProThrGlyAsnLeuValAspGluIleAspValProAsnIleGlyArgLeuLys-204
223-GlyTyrThrGlyLysGluLeuGlnAspAspIleAsnAsnAspAlaAlaAlaLeuGluLysPheGluLysIle
ArgAla-248
259-AspValSerGluAlaAlaAlaArgAlaHisThrPro-270
281-TyrThrAlaSerSerGlyLysThrValAsn-290
333-AlaGlyGlyGlyThrArgLysGluValArgPheGlyHisProSerGlyThrLeuArg-351
356-AlaGluCysGlnAspGlyGln-362
369-ValMetSerArgSerAlaArgValMet-377
382-ValArgValProGluAspCysPhe-389

Hydrophilic Regions - Hopp-Woods
22-LysArgSerAspLeuProGluAlaAlaArgGluAlaGlySerAlaArgAspLysIleLeu-41
49-AspProTyrGlyLysGlnIleAsp-56
62-SerSerSerThrSer-66
69-ValIleLeuAspLysSerGluArgAlaAspHisAspVal-81
89-SerIleAspLysProPhe-94
116-GlyLeuValAspLysGlyLysIleProSer-125
157-GlyAspPheGluLeu-161
177-AspProAlaAspGlyGluGly-183
191-LeuValAspGluIleAspVal-197
224-TyrThrGlyLysGluLeuGlnAspAspIleAsnAsnAspAlaAlaAlaLeuGluLysPheGluLysIleArg
Ala-248
259-AspValSerGluAlaAlaAlaArgAlaHisThr-269
283-AlaSerSerGlyLysThrValAsn-290
335-GlyGlyThrArgLysGluValArgPhe-343
356-AlaGluCysGlnAsp-360
372-ArgSerAlaArgValMet-377
384-ValProGluAspCysPhe-389
602-2
AMPHI Regions - AMPHI
21-ValAsnArgHisGlyGln-26
30-GlyGlyLeuAspAlaPheCys-36

54-ArgGlnIleAlaGlnIle-59
61-AlaGlyLeuHisValCysAsnSerVal-69
78-HisValIleValGluMetCysAlaTrpTyrGly-88

Antigenic Index - Jameson-Wolf
5-GlnCysAspLysThrArgHisMetArgPro-14
19-ArgGlnValAsnArgHisGlyGlnThrGlyAsnGlyGlyLeuAspAla-34
36-CysSerLeuGlnGlyAsnArgLysAlaGlnValPheAspThrAspLeuIleAspArgGlnIle-56
90-SerAlaGlyGluTyr-94
99-GlnMetArgAspTyrIle-104

Hydrophilic Regions - Hopp-Woods
5-GlnCysAspLysThrArgHisMetArg-13
20-GlnValAsnArgHisGlyGln-26
39-GlnGlyAsnArgLysAlaGlnValPhe-47
50-AspLeuIleAspArgGlnIle-56
603-2
AMPHI Regions - AMPHI
69-MetLeuLeuAsnGluLeuGluLys-76
107-ValMetAspGluLeuAsnAlaCysIlePro-116
121-HisAsnProAlaAsnIleSerGlyIleLeuAla-131
135-HisPheProGlyLeuProAsnValGly-143
148-SerPheHisGlnThrMetPro-154
161-AlaValProArgGluLeu-166
188-GluAlaAlaArgIleLeuGlyLysProLeuGluAspIleArgMetIleIleAlaHis-206
209-AsnGlyAlaSerIleThrAlaIleLysAsnGlyLysSerVal-222
229-ThrProIleGluGly-233
248-TyrSerTyrLeuThrSer-253
273-LeuGlyIleSerGlu-277
279-SerAsnAspCysArg-283
306-ArgLeuAlaLysTyrIleAlaSerMet-314
342-ValSerTyrLeuAsp-346

Antigenic Index - Jameson-Wolf
12-GlySerSerSerLeuLysGlyAlaValIleAspArgLysSerGlySer-27
33-LeuGlyGluArgLeuThrThrProGluAla-42
45-ThrPheAsnLysAspGlyAsnLysArgGlnValProLeuSerGlyArgAsnCysHis-63
73-GluLeuGluLysHisGlyLeuHisAspArgIleLysAlaIleGly-87
91-AlaHisGlyGlyGluLysTyrSerGlu-99
106-AlaValMetAspGluLeuAsn-112
152-ThrMetProGluArgAlaTyr-158
164-ArgGluLeuArgLysLysTyrAlaPheArgArgTyrGlyPheHisGlyThrSerMetArg-183
188-GluAlaAlaArgIleLeuGlyLysProLeuGluAspIleArg-201
207-LeuGlyAsnGlyAla-211
214-ThrAlaIleLysAsnGlyLysSerValAspThrSerMetGly-227
238-ThrArgCysGlyAspIleAspProGlyVal-247
260-AlaGlnValAspGluMetLeuAsnLysLysSerGly-271
276-SerGluLeuSerAsnAspCysArgThrLeuGluIleAlaAlaAspGluGlyHisGluGlyAlaArgLeu-29
8
329-GlyIleGlyGluAsnSerArgAsnIleArgAlaLysThr-341
352-IleAspThrLysAlaAsnMetGluLysArgTyrGlyAsnSerGlyIle-367
369-SerProThrAspSerSerPro-375
381-ProThrAsnGluGluLeu-386

Hydrophilic Regions - Hopp-Woods

19-AlaValIleAspArgLysSerGly-26
33-LeuGlyGluArgLeuThrThr-39
46-PheAsnLysAspGlyAsnLysArgGlnValProLeuSerGlyArgAsnCysHis-63
73-GluLeuGluLysHisGlyLeuHisAspArgIleLysAlaIleGly-87
92-HisGlyGlyGluLysTyrSerGlu-99
106-AlaValMetAspGluLeuAsn-112
153-MetProGluArgAlaTyr-158
164-ArgGluLeuArgLysLysTyrAlaPhe-172
188-GluAlaAlaArgIleLeuGlyLysProLeuGluAspIleArg-201
217-LysAsnGlyLysSerValAspThr-224
239-ArgCysGlyAspIleAspPro-245
260-AlaGlnValAspGluMetLeuAsnLysLysSerGly-271
277-GluLeuSerAsnAspCysArgThrLeuGluIleAlaAlaAspGluGlyHisGluGlyAlaArgLeu-298
330-IleGlyGluAsnSerArgAsnIleArgAlaLysThr-341
352-IleAspThrLysAlaAsnMetGluLysArgTyrGly-363
382-ThrAsnGluGluLeu-386

604-2

AMPHI Regions - AMPHI
36-HisArgValValGlnPheAla-42
53-ValGlyGlyValHisGlyPheAlaThr-61
95-ArgThrValSerAlaAspPheLeuGluPhePhe-105
113-AspValValLeuGlnLeuPheAlaCysValAlaGlnValGlyGlyIleGlnGluAsn-131
148-ArgHisIleAsnPheIleAspGlnIleAlaGlyTrpGlu-160
166-ValGlyTrpIleLysLysPheAsp-173
191-PheGlnAsnCysAlaValLeuHisArg-199

Antigenic Index - Jameson-Wolf
11-AlaAlaCysGlyLysValAspGlnArgThrGlyTyrGlyGlyGlyGlyArgAsnGlyAsnArgGlyGlyThrH
is-35
67-GlyGlyGlyArgAspGluGlyAspPheArgArgValArgAlaSerGlySerPhe-84
106-GlnSerArgGlyIle-110
127-GlyIleGlnGluAsnGlyArgAsnAlaArgValAspGluArgGlyPheGln-143
175-TyrPheGlyCysArgGluArgTyrAlaVal-184
201-MetGlyAsnAsnGly-205
211-LeuProAspPheAspArgAlaAspAlaVal-220

Hydrophilic Regions - Hopp-Woods
14-GlyLysValAspGlnArgThrGlyTyr-22
24-GlyGlyGlyArgAsnGlyAsnArgGlyGlyThrHis-35
68-GlyGlyArgAspGluGlyAspPheArgArgValArgAla-80
127-GlyIleGlnGluAsnGlyArgAsnAlaArgValAspGluArgGlyPhe-142
178-CysArgGluArgTyrAlaVal-184
213-AspPheAspArgAlaAspAlaVal-220

605

AMPHI Regions - AMPHI
13-ArgGlnIleTrpLysIleAlaAsp-20
38-ThrLeuPheTyrArgPheIleSerGluAsnPheThrAspTyrMetGln-53
107-LysLeuLysGluIlePheThrAlaIle-115
128-IleLysGlyLeuPheAspAspPheAsp-136
141-ArgLeuGlySerThr-145
155-AlaValLeuLysGlyValAlaGluLeu-163
173-IleAspLeuPheGlyAspAlaTyrGluTyrLeuIleSerAsn-186
188-AlaAlaAsnAlaGlyLys-193
204-ValSerLysLeuIleAlaArg-210
217-GluLysValAsnLysIleTyrAspPro-225

240-PheAspGluHisIle-244
291-AspSerLysProPheAspAlaIleValSerAsn-301
341-HisAlaLeuAsnTyr-345
355-ValSerPheProGly-359
433-GluHisIleAlaGluIleValLysLeuPheAla-443
452-AlaGlnAsnAlaAlaGlnGlnThr-459
478-ThrArgGluIleIleAspIle-484
489-AlaGluIleGlyGluThrValAlaLysIleGluArgLeuArgArgGluIleAspGluValIleAlaGluIle
Glu-513

Antigenic Index - Jameson-Wolf
5-MetGlnGlnArgAlaGlnLeu-11
18-IleAlaAspGluValArgGlyAlaValAspGlyTrpAsp-30
44-IleSerGluAsnPheThrAspTyrMetGlnAlaGlyAspSerSerIleAsp-60
63-AlaMetProAspSer-67
71-ProGluIleLysAspAspAlaValLysVal-80
98-AlaHisGlnAsnGluGluLeuAsnThrLysLeuLysGlu-110
116-GluSerSerAlaSerGlyTyrProSerGluGlnAspIleLysGlyLeuPheAspAspPheAspThrThrSer
SerArgLeu-142
146-ValAlaAspLysAsnLysArgLeu-153
190-AsnAlaGlyLysSerGlyGlyGluPhePheThr-200
215-GlyGlnGluLysValAsnLysIleTyrAspProAlaCysGlySerGlySer-231
235-GlnAlaLysLysGlnPheAsp-241
253-GluIleAsnHisThrThrTyrAsn-260
280-LeuGlyAspThrLeuThrAsnProLysLeuLysAspSerLysProPheAsp-296
309-IleGlySerAspAspProThrLeuIleAsnAspAspArgPheAlaPro-324
330-ProLysSerLysAlaAsp-335
345-TyrLeuSerGlyArgGlyArgAlaAla-353
362-TyrArgGlyGlyAlaGluGlnLysIleArg-371
403-LeuSerLysHisLysAspAsnThrAsp-411
419-GlyPhePheLysLysGluThrAsnAsnAsnValLeuIle-431
442-PheAlaAspLysAlaAspVal-448
458-GlnThrValLysAspAsnGlyTyr-465
473-ValGluAlaGluAspThrArgGluIleIleAsp-483
490-GluIleGlyGluThrValAlaLysIleGluArgLeuArgArgGluIleAspGluValIleAla-510

Hydrophilic Regions - Hopp-Woods
5-MetGlnGlnArgAlaGlnLeu-11
18-IleAlaAspGluValArgGlyAlaValAsp-27
55-GlyAspSerSerIle-59
71-ProGluIleLysAspAspAlaValLysVal-80
98-AlaHisGlnAsnGluGluLeuAsnThrLysLeuLysGlu-110
122-TyrProSerGluGlnAspIleLysGlyLeuPheAspAspPheAspThrThrSerSerArgLeu-142
146-ValAlaAspLysAsnLysArgLeu-153
191-AlaGlyLysSerGlyGly-196
215-GlyGlnGluLysValAsnLysIleTyrAsp-224
235-GlnAlaLysLysGlnPheAsp-241
287-ProLysLeuLysAspSerLysProPhe-295
310-GlySerAspAspProThrLeuIleAsnAspAspArgPheAla-323
330-ProLysSerLysAlaAsp-335
348-GlyArgGlyArgAla-352
364-GlyGlyAlaGluGlnLysIleArg-371
404-SerLysHisLysAspAsnThrAsp-411
419-GlyPhePheLysLysGluThrAsn-426
442-PheAlaAspLysAlaAspVal-448

458-GlnThrValLysAspAsnGly-464
473-ValGluAlaGluAspThrArgGluIleIleAsp-483
490-GluIleGlyGluThrValAlaLysIleGluArgLeuArgArgGluIleAspGluValIleAla-510
606
AMPHI Regions - AMPHI
72-LeuLeuAspHisMetThrArgAspGlu-80
90-AlaHisValGlyAsnGlyAsp-96
100-LeuThrLeuIleGlnGlyValValAsnThrPhe-110
116-ArgIleIleAlaAsn-120
139-SerMetValPheGlnIleLeuPheGlyPheLeuAlaSerLeuIleVal-154
171-LysLeuValGlyAlaProLysMetIleSerAlaLeuGlnArg-184
191-AspLeuProGluGluMetAsnAla-198

Antigenic Index - Jameson-Wolf
13-GluValIleAspThrProArgThrGluGluGluAla-24
31-GluAlaGlnAlaArgGlnTrpAsnLeuLysThrProGlu-43
48-HisSerProGluProAsnAla-54
57-ThrGlyAlaSerArgAsnSerSer-64
75-HisMetThrArgAspGluValGluAla-83
92-ValGlyAsnGlyAsp-96
122-IleAlaArgAsnAsnAspGlySerGlnSerGlnGlyThr-134
159-ArgGlnArgGluTyrArgAlaAspAlaGlyAla-169
182-LeuGlnArgLeuLysGlyAsnProValAspLeuProGluGluMetAsn-197
203-GlyAspThrArgAspSerLeuLeuSerThrHisProSerLeuAspAsnArgIleAlaArgLeuLysSer-22
5

Hydrophilic Regions - Hopp-Woods
13-GluValIleAspThrProArgThrGluGluGluAla-24
59-AlaSerArgAsnSer-63
75-HisMetThrArgAspGluValGluAla-83
124-ArgAsnAsnAspGlySerGlnSer-131
159-ArgGlnArgGluTyrArgAlaAspAlaGlyAla-169
183-GlnArgLeuLysGlyAsnPro-189
191-AspLeuProGluGluMetAsn-197
203-GlyAspThrArgAspSerLeu-209
214-ProSerLeuAspAsnArgIleAlaArgLeuLysSer-225
607
AMPHI Regions - AMPHI
18-ArgLeuLeuThrThrLeuAlaLeu-25
70-PheMetGlyIleMetAlaAlaLeuAsnProMetIleAlaGln-83
90-ThrAspGluValGlyGluThr-96
104-GlyLeuPheLeuGlyValPheGlyMetValLeuMetTrpAlaAlaIleThrProPheArgAsnTrpLeuThr
LeuSerAspTyrValGluGlyThrMet-136
151-MetValHisArgAlaLeuHisAlaTyrThrSerSer-162
226-PhePheArgProPheGly-231
244-PheLysGlnIleTrpLysIleGlyAla-252
320-AlaArgTyrIleSerGlyVal-326
337-IleThrValLeuSerLeuVal-343
373-PheGlnProAlaAspPheThrGlnCysIleAlaSerTyrAla-386
424-TyrGlyPheTrpThrAlaLeuIleAla-432

Antigenic Index - Jameson-Wolf
15-LysGluValArgLeu-19
47-GlyAlaGlyLysGluAspLeuAla-54
86-GlyAlaGlyLysThrAspGluValGlyGluThrGlyArgGlnGlyIle-101

121-ProPheArgAsnTrp-125
128-LeuSerAspTyrValGluGlyThr-135
160-ThrSerSerLeuAsnArgProArgLeu-168
234-AlaLysPheGlyLysProAspTrp-241
311-SerLeuGlyArgArgGluPheSerArgAlaArgTyrIleSer-324
353-TyrAsnAsnAspPro-357
388-ArgGlyTyrLysValThrLys-394
447-LeuCysSerArgGluMetValArgSerHisLysAlaVal-459

Hydrophilic Regions - Hopp-Woods
15-LysGluValArgLeu-19
47-GlyAlaGlyLysGluAspLeuAla-54
88-GlyLysThrAspGluValGlyGluThrGlyArg-98
163-LeuAsnArgProArg-167
312-LeuGlyArgArgGluPheSerArg-319

390-TyrLysValThrLys-394
447-LeuCysSerArgGluMetValArgSerHisLysAlaVal-459

608
AMPHI Regions - AMPHI
66-AlaValGlnLysIleLeuGln-72
93-ValLeuSerLeuLeu-97
103-ArgAlaSerAspGluLeuAlaArgIlePheGlyThrGln-115
124-AspIleGlyHisGlyIleLysGlnIleGlyArgAsnIleAlaGluGlnIleGlyGlyPheSerArgGluSer
GluSer-149
154-AsnGluAlaLeuAlaAspCysLeuAspGluIleSerArgLeuArgAspGlyValGluArgLeuAsnGluArg
LeuAspArgLeu-181

Antigenic Index - Jameson-Wolf
13-LeuGlnSerProAspSerArgSerGluLeu-22
39-LeuAlaGlyArgIleThrGluAspGlyLeuLeuSerAlaGlyAsnGlyPheAlaAspThrGluIleThrPheA
rgAsnSerAla-66
71-LeuGlnGlyGlyGluProGlyAlaGlyAspIleGlyLeuGluGly-85
98-GlySerLeuArgSerArgAlaSerAspGluLeuAla-109
114-ThrGlnAlaAspIleGlySerArgAlaAlaAsp-124
131-GlnIleGlyArgAsnIleAla-137
140-IleGlyGlyPheSerArgGluSerGluSerAlaAsnIleGlyAsnGluAlaLeuAlaAspCysLeuAspGlu
IleSerArgLeuArgAspGlyValGluArgLeuAsnGluArgLeuAspArgLeuGluArgAspIleTrp-186

Hydrophilic Regions - Hopp-Woods
15-SerProAspSerArgSerGluLeu-22
39-LeuAlaGlyArgIleThrGluAspGlyLeu-48
56-AlaAspThrGluIleThrPhe-62
74-GlyGluProGlyAlaGly-79
81-IleGlyLeuGluGly-85
100-LeuArgSerArgAlaSerAspGluLeuAla-109
116-AlaAspIleGlySerArgAlaAlaAsp-124
143-PheSerArgGluSerGluSerAlaAsnIleGly-153
156-AlaLeuAlaAspCysLeuAspGluIleSerArgLeuArgAspGlyValGluArgLeuAsnGluArgLeuAsp
ArgLeuGluArgAspIleTrp-186
609
AMPHI Regions - AMPHI
15-ThrLeuAspAlaPheVal-20
30-HisHisIlePheHisGluPheArgValPheValGlyPhePhe-43

52-PheGluGlnAlaValGlu-57
67-IleAspAspPheLeu-71
114-ValAlaValCysProVal-119

Antigenic Index - Jameson-Wolf
10-AlaLeuAspAspGluThrLeu-16
20-ValGlyAsnGlnArgSerSerAspIleAla-29
69-AspPheLeuAspThrAspPheGlyIle-77
79-SerGlnAlaAspGlyAsnValArg-86
99-GlyThrArgAlaLysArgGlyTyrGlyAsnHisAspLeu-111
122-PheAlaArgGluThrAspIle-128

Hydrophilic Regions - Hopp-Woods
10-AlaLeuAspAspGluThrLeu-16
23-GlnArgSerSerAspIle-28
79-SerGlnAlaAspGlyAsnVal-85
100-ThrArgAlaLysArgGlyTyrGly-107
122-PheAlaArgGluThrAspIle-128
610
AMPHI Regions - AMPHI
6-MetGlnPheProTyrArg-11
18-MetArgArgMetArgArg-23
98-GluArgAlaGlnGluAlaTyr-104
111-ProSerThrValArgAlaLeuArgGluArg-120
187-IleArgGluAlaLeuGlu-192
208-TyrAlaSerAlaPheTyrGlyProPheArgAsp-218
223-SerGlyAsnLeuGlyLysAlaAsp-230
268-LeuAspValValArgArgValLysAspGlu-277
296-AlaAlaIleAlaAsn-300

Antigenic Index - Jameson-Wolf
11-ArgAsnValProAlaSerArgMetArgArgMetArgArgAspAspPheSerArgArgLeuMetArgGluHisT
hrLeuThrAlaAspAsp-40
50-GlySerAlaArgGluGluAspValProSerMetProGlyValLysArgGlnSerLeuAsp-69
75-AlaGluGluAlaValLys-80
94-AlaAsnLysThrGluArgAlaGlnGluAlaTyrAsnProGluGlyLeuVal-110
115-ArgAlaLeuArgGluArgPhePro-122
139-GlyGlnAspGlyLeuThrAspGluAsnGlyTyrValMetAsnAspGluThrVal-156
175-AlaProSerAspMetMetAspGlyArgIleGlyAlaIleArgGluAlaLeuGluAspAlaGlyHis-196
215-ProPheArgAspAlaValGlySerSerGlyAsnLeuGlyLysAlaAspLysLysThrTyrGlnMetAspPro
AlaAsnThrAspGluAlaLeuHis-246
250-LeuAspIleGlnGluGlyAlaAsp-257
270-ValValArgArgValLysAspGluPheGlyVal-280
301-GlyTrpLeuAspGlyGlyLysValVal-309
317-LysArgAlaGlyAlaAspGly-323
331-GluAlaAlaLysMetLeuLysArg-338

Hydrophilic Regions - Hopp-Woods
14-ProAlaSerArgMetArgArgMetArgArgAspAspPheSerArgArgLeuMetArgGluHisThrLeuThrA
la-38
50-GlySerAlaArgGluGluAspValProSer-59
61-ProGlyValLysArgGlnSerLeuAsp-69
75-AlaGluGluAlaValLys-80
95-AsnLysThrGluArgAlaGlnGluAlaTyrAsn-105
115-ArgAlaLeuArgGluArgPhePro-122

141-AspGlyLeuThrAspGluAsnGly-148
151-MetAsnAspGluThrVal-156
178-AspMetMetAspGlyArgIleGlyAlaIleArgGluAlaLeuGluAspAlaGly-195
216-PheArgAspAlaValGly-221
225-AsnLeuGlyLysAlaAspLysLysThrTyrGln-235
238-ProAlaAsnThrAspGluAlaLeuHis-246
250-LeuAspIleGlnGluGlyAlaAsp-257
270-ValValArgArgValLysAspGluPheGly-279
317-LysArgAlaGlyAla-321
331-GluAlaAlaLysMetLeuLysArg-338
611
AMPHI Regions - AMPHI
15-CysArgLeuPheGlyLysLeuSerLeu-23
26-ArgLeuLeuLeuGlyLeu-31
48-ArgSerValArgArgValIle-54
63-GlnValValAlaVal-67
104-ValPheIleGluAspPheVal-110
130-GlyPheLeuGlyAsnValLeuArgThr-138

Antigenic Index - Jameson-Wolf
1-MetProSerGluAsnGlyMetGlyLysArgGlnLeuAla-13
32-CysArgSerGlyValCysArgGlyArgCys-41
45-PheProSerArgSerValArgArgValIlePheArgArgValArgIle-60
119-AsnProAlaAspPheArgVal-125
142-AlaSerGlnGluAsp-146
Hydrophilic Regions - Hopp-Woods
1-MetProSerGluAsnGlyMetGlyLysArgGlnLeuAla-13
35-GlyValCysArgGlyArgCys-41
53-ValIlePheArgArgValArgIle-60
121-AlaAspPheArgVal-125
142-AlaSerGlnGluAsp-146
612-2
AMPHI Regions - AMPHI
6-AsnIleAlaLysLysLeuAlaGlyValAsp-15
57-LysAlaValGluLysCysAlaGluAsnValLeu-67
81-GlyAsnPheProAsn-85

Antigenic Index - Jameson-Wolf
7-IleAlaLysLysLeuAlaGlyValAsp-15
27-AspPheGlyArgAspAspAlaValArgHisSerGlyVal-39
57-LysAlaValGluLysCysAlaGlu-64
97-GlyHisHisArgAsnProTyrLysSer-105
Hydrophilic Regions - Hopp-Woods
7-IleAlaLysLysLeuAlaGlyValAsp-15
28-PheGlyArgAspAspAlaValArg-35
57-LysAlaValGluLysCysAlaGlu-64
101-AsnProTyrLysSer-105
613-2
AMPHI Regions - AMPHI
7-SerArgArgSerLeu-11
95-MetProArgMetArgSer-100
103-SerProMetSerProAla-108
115-ArgIlePheCysThrAlaLeuLeuArgLys-124
140-SerSerValMetArgProAla-146
168-LeuSerGlyLeuCysArgIle-174

Antigenic Index - Jameson-Wolf
1-MetSerArgSerSerArgSerArgArgSerLeuArgArgSerThrProSerArg-18
23-SerSerArgGlnSerAlaArgAla-30
35-PheAlaAspSerAspSerArgGluAsnProProIleCysSer-48
73-ProLysIleArgAlaAsnSerSerAspAlaArgGluArgArgLeuProSerArgAspSerThrAla-94
96-ProArgMetArgSerProSerSerProMetSerProAlaProGlySerProProTrp-114
130-AlaLysProPheProAlaGluSerLysProSerSerValMetArgProAlaSer-147
162-AlaAlaSerSerGluArgLeuSerGlyLeuCysArgIleArgArg-176
178-MetMetGlyArgArgAlaAspIlePheSerAspArgGlyGlyGlu-192
205-LeuSerArgTyrArgLysArgTyrGly-213

Hydrophilic Regions - Hopp-Woods
1-MetSerArgSerSerArgSerArgArgSerLeuArgArgSerThrProSer-17
24-SerArgGlnSerAlaArgAla-30
36-AlaAspSerAspSerArgGluAsnProPro-45
73-ProLysIleArgAlaAsnSerSerAspAlaArgGluArgArgLeuProSerArgAspSerThrAla-94
96-ProArgMetArgSerProSer-102
133-PheProAlaGluSerLysProSerSerValMetArg-144
162-AlaAlaSerSerGluArgLeuSerGly-170
172-CysArgIleArgArg-176
178-MetMetGlyArgArgAlaAspIlePheSerAspArgGlyGlyGlu-192
206-SerArgTyrArgLysArgTyrGly-213
614-2
AMPHI Regions - AMPHI
20-SerGlnPheIleGlnGlnVal-26
65-AsnLeuIleLysThrLeuLeuAsp-72
90-AlaLeuPheTyrSerLeuLeuProValLeu-99
144-ValAlaGlyCysAspGluAlaLysGluGluValGlnGluIleValAspTyrLeuLysAlaProAsnArgTyr
GlnSerLeu-170
210-AspPheValGluMetPheVal-216
222-ArgValArgAspMetPheGluGln-229
242-GluIleAspAlaValGlyArg-248
295-ProAlaLeuGlnArgProGlyArgPheAsp-304
333-SerValAspLeuLeuSerLeuAla-340
349-AlaAspLeuAlaAsnLeuValAsn-356
478-SerAsnAspPheGluArgAlaThrGlnMet-487
526-SerGluLysThrGln-530
536-GluIleArgArgIleLeuAsp-542
561-ThrMetCysLysAlaLeuMetGluTrpGluThr-571
591-AspTyrSerHisAsn-595
619-ProAlaProAlaAspThr-624

Antigenic Index - Jameson-Wolf
7-LeuAspGlyLysLysGluAspAsnGlyGlnIleGlu-18
26-ValAsnAsnGlyGluValSerGly-33
45-LeuIleLysGlyGluArgThrAspLysSerThrPhe-56
60-AlaProLeuAspAspAsnLeuIle-67
70-LeuLeuAspLysAsnValArgValLysValThrProGluGluLysProSerAla-87
111-MetGlnThrGlyGlyGlyGlyLysGlyGly-120
123-SerPheGlyLysSerArgAlaArgLeuLeuAspLysAspAlaAsnLys-138
145-AlaGlyCysAspGluAlaLysGluGluValGlnGlu-156
161-LeuLysAlaProAsnArgTyrGlnSerLeuGlyGlyArgValProArgGly-177
182-GlySerProGlyThrGlyLysThrLeuLeu-191
207-SerGlySerAspPhe-211

219-GlyAlaSerArgValArgAspMetPheGluGlnAlaLysLysAsnAla-234
241-AspGluIleAspAlaValGlyArgGlnArgGlyAlaGlyLeuGlyGlyGlyAsnAspGluArgGluGlnThr
Leu-265
272-MetAspGlyPheGluSerAsnGln-279
287-ThrAsnArgProAspValLeuAspProAlaLeuGlnArgProGlyArgPheAspArg-305
311-LeuProAspIleArgGlyArgGluGlnIle-320
323-ValHisSerLysLysValProLeuAspGluSerValAsp-335
341-ArgGlyThrProGlyPheSerGly-348
362-AlaGlyArgArgAsnLysValLysValAspGlnSerAspPheGluAspAlaLysAspLysIleTyrMetGly
ProGluArgArgSerMetValMetHisGluAspGluLysArgAlaThrAla-402
425-ThrIleMetProArgGlyArgAla-432
438-GlnLeuProGluArgAspArgIleSerMetTyrLysAspGlnMet-452
460-PheGlyGlyArgIleAlaGlu-466
474-SerThrGlyAlaSerAsnAspPheGluArgAlaThrGlnMetAlaArgGluMetValThr-493
495-TyrGlyMetSerAspLysMetGly-502
507-AlaGluAsnGluGlyGluValPheLeu-515
518-SerValThrArgSerGlnAsnIleSerGluLysThrGlnGlnAspIleAspAlaGluIleArgArgIleLeu
AspGluGlnTyr-545
551-IleLeuAspGluAsnArgAspLysMetGluThrMetCys-563
570-GluThrIleAspArgAspGlnVal-577
581-MetAlaGlyLysGlnProSerProProLysAspTyrSerHisAsnLeuArgGluAsnAlaAspAlaAlaGlu
AspAsnAlaProHisAlaProThrArgGluGluThrGluAlaProAlaProAlaAspThrAlaSerThrGluSerG
luGlnGlnProGluAsnLysAla-637

Hydrophilic Regions - Hopp-Woods
7-LeuAspGlyLysLysGluAspAsnGlyGln-16
27-AsnAsnGlyGluValSer-32
46-IleLysGlyGluArgThrAspLysSerThr-55
61-ProLeuAspAspAsnLeuIle-67
70-LeuLeuAspLysAsnValArgValLysValThrProGluGluLysProSerAla-87
115-GlyGlyGlyLysGlyGly-120
125-GlyLysSerArgAlaArgLeuLeuAspLysAspAlaAsnLys-138
145-AlaGlyCysAspGluAlaLysGluGluValGlnGlu-156
162-LysAlaProAsnArg-166
171-GlyGlyArgValProArg-176
221-SerArgValArgAspMetPheGluGlnAlaLysLysAsnAla-234
241-AspGluIleAspAlaValGlyArgGlnArgGlyAlaGly-253
256-GlyGlyAsnAspGluArgGluGlnThr-264
273-AspGlyPheGluSer-277
287-ThrAsnArgProAspValLeuAsp-294
296-AlaLeuGlnArgProGlyArgPheAspArg-305
312-ProAspIleArgGlyArgGluGlnIle-320
324-HisSerLysLysValProLeuAspGluSerValAsp-335
362-AlaGlyArgArgAsnLysValLysValAspGlnSerAspPheGluAspAlaLysAspLysIleTyrMetGly
ProGluArgArgSerMetValMetHisGluAspGluLysArgAlaThrAla-402
428-ProArgGlyArgAla-432
439-LeuProGluArgAspArgIleSerMetTyrLys-449
477-AlaSerAsnAspPheGluArgAlaThrGlnMetAlaArgGluMetValThr-493
496-GlyMetSerAspLysMetGly-502
507-AlaGluAsnGluGlyGluValPheLeu-515
518-SerValThrArgSerGlnAsnIleSerGluLysThrGlnGlnAspIleAspAlaGluIleArgArgIleLeu
AspGluGlnTyr-545
551-IleLeuAspGluAsnArgAspLysMetGluThrMetCys-563
570-GluThrIleAspArgAspGlnVal-577

584-LysGlnProSerProProLysAspTyrSerHisAsnLeuArgGluAsnAlaAspAlaAlaGluAspAsnAla
Pro-608
610-AlaProThrArgGluGluThrGluAlaProAlaProAlaAspThrAlaSerThrGluSerGluGlnGlnPro
GluAsnLysAla-637
616-2
AMPHI Regions - AMPHI
6-LysMetValValGlyLeu-11
13-AsnProGlyLysGluTyrGlu-19
48-PheGlyGluValAlaArgAla-54
77-ValAlaAlaLeuAlaGlnPheTyrLys-85
115-GlyHisAsnGlyLeuLysAspIle-122
159-HisArgArgGlnIleAspAspAlaValAlaLysSerLeuGlnAlaIleProAspIleLeuAlaGlyLysTrp
GluGluAlaThrArgPheLeuHisSer-191

Antigenic Index - Jameson-Wolf
11-LeuGlyAsnProGlyLysGluTyrGluGlnThrArgHisAsnAlaGlyPhe-27
39-AlaSerPheLysGluGluLysLysPhePhe-48
55-AlaLeuProAspGly-59
70-MetAsnArgSerGlyGlnAla-76
86-IleLysProGluGlu
96-AspGluLeuAspIleProCysGlyArgIleLysPhe-107
109-LeuGlyGlyGlyAsnGlyGlyHisAsnGlyLeuLysAspIleGlnAla-124
127-GlyThrAlaAspTyrTyrArg-133
138-IleGlyHisProGlyAspArgAsnLeu-146
152-LeuAsnLysProSerThrGluHisArgArgGlnIleAspAspAlaValAla-168
181-LysTrpGluGluAlaThrArg-187

Hydrophilic Regions - Hopp-Woods
13-AsnProGlyLysGluTyrGluGlnThrArgHis-23
39-AlaSerPheLysGluGluLysLysPhePhe-48
86-IleLysProGluGlu-90
96-AspGluLeuAspIleProCysGlyArgIleLysPhe-107
117-AsnGlyLeuLysAspIleGlnAla-124
140-HisProGlyAspArgAsnLeu-146
155-ProSerThrGluHisArgArgGlnIleAspAspAlaValAla-168
181-LysTrpGluGluAlaThrArg-187
619
AMPHI Regions - AMPHI
50-LysLeuAlaAlaLeuLeu-55
66-GlnLeuPheGlnThrLeuThrAsn-73
134-GlnGlyGlyArgAspLeu-139
146-GlyValIlePheGlyIleLeuPheArgSerLeuSerSerLeuLeuSerArg-162
165-AspProGluGluPhe-169
175-AsnMetPheAlaGlyPheAsnThrValHisSer-185
246-AlaValValGlyProValSerPhePheGlyLeuLeuAlaAlaSerLeuAlaAsnHisPheSer-266
294-GluHisLeuLeuGly-298
303-LeuSerValValValGluPhe-309

Antigenic Index - Jameson-Wolf
1-MetProSerGluLysAsnIle-7
11-AlaGlySerSerArgPro-16
35-AsnValLysGlyAspTrpAsp-41
132-IleLysGlnGlyGlyArgAspLeuSer-140
163-MetIleAspProGluGluPheThr-170
203-TrpArgGluArgTyrArgLeuAsp-210

215-GlyArgAspGlnAlaVal-220
265-PheSerProSerValLysHisSerVal-273

Hydrophilic Regions - Hopp-Woods
1-MetProSerGluLysAsnIle-7
134-GlnGlyGlyArgAspLeuSer-140
163-MetIleAspProGluGluPheThr-170
203-TrpArgGluArgTyrArgLeu-209
215-GlyArgAspGlnAla-219
269-ValLysHisSerVal-273
620
AMPHI Regions - AMPHI
9-ValAlaValSerAlaLeuSerAlaCysArgGlnAla-20
31-IleSerAspArgSerVal-36
67-SerThrIleLysGlnMetPheGlyTyrThrLysLeuProGluGluProLysGlyIleArgValIleTyrValT
hrAspMetGlyAsnValThrAspTrpThr-100
139-GlnAlaGluLysPhe-143

Antigenic Index - Jameson-Wolf
15-SerAlaCysArgGlnAlaGluGluGlyProProProLeuProArgGlnIleSerAspArgSerValGlyHis-
38
43-AsnLeuThrGluHisAsnGlyProLysAla-52
57-AsnGlyLysProAspGlnProVal-64
75-TyrThrLysLeuProGluGluProLysGlyIle-85
97-ThrAspTrpThrAsnProAsnAlaAspThrGluTrpMetAspAlaLysLys-113
125-GlyMetGlyAlaGluAspAlaLeuProPheGlyAsnLysGluGlnAlaGluLysPheAlaLysAspLysGly
GlyLysValValGlyPheAspAspMetProAspThrTyr-161

Hydrophilic Regions - Hopp-Woods
18-ArgGlnAlaGluGluGlyProProProLeu-27
30-GlnIleSerAspArgSerVal-36
46-GluHisAsnGlyProLys-51
58-GlyLysProAspGln-62
77-LysLeuProGluGluProLysGlyIle-85
103-AsnAlaAspThrGluTrpMetAspAlaLysLys-113
127-GlyAlaGluAspAlaLeu-132
135-GlyAsnLysGluGlnAlaGluLysPheAlaLysAspLysGlyGlyLys-150
155-AspAspMetProAsp-159
622
AMPHI Regions - AMPHI
28-LeuProLysAlaValArgAsnLeuAlaArg-37
62-GluGluIleIleArgTrpLeuAlaAsp-70
112-IleLeuGlyGlnIleLysAspAlaValArgValAlaGln-124
131-LysLysLeuAsnAlaLeuPheGlnLys-139
142-SerValAlaLysGluVal-147
169-GluGlnIlePheProAspIleGlyAsp-177
187-GluMetIleGluLeuValAla-193
214-AlaGlnGluLeuCysAspLys-220
232-AspLeuProAlaIleLeuHis-238
288-AspLeuAsnAspAla-292
297-ValAspAspMetValAsnIleValGlnSerGly-307
324-GluLysValAlaGluPheValArgGlnGln-333
345-LeuArgAspGluGlyGluLys-351
354-LysGlnValLeuGluAsnAlaMetLysGlnLeuAlaLys-366
372-GluValLeuGluArgLeuSerValGlnLeuThr-382

384-LysLeuLeuHisSerProThrGlnThrLeuAsnLysAlaGlyGlu-398

Antigenic Index - Jameson-Wolf
16-SerIleArgGluLysLeuAla-22
30-LysAlaValArgAsnLeuAlaArgSerAsnAlaAla-41
49-ThrCysAsnArgThrGlu-54
57-CysValGlyAspSerGluGluIleIle-65
75-ProIleGluGluIleArgPro-81
87-AspMetGlnGluThrValArgHis-94
115-GlnIleLysAspAlaValArgValAlaGlnGluGlnGluSerMetGlyLysLysLeu-133
142-SerValAlaLysGluValArgThrAspThrAlaValGlyGluAsnSerVal-158
174-AspIleGlyAspLeuAsn-179
199-LysSerProArgLeu-203
210-ThrLeuAlaArgAlaGlnGluLeuCysAspLysLeuGlyValAsnAlaGlu-226
257-GlyMetValGluArgAlaLeuLysGlnArgGlnSer-268
277-AlaValProArgAspIleGluAlaGluValGlyAspLeuAsnAsp-291
305-GlnSerGlyLysGluAlaArgGlnLysAlaAlaAlaAla-317
321-LeuValSerGluLysValAlaGluPheValArgGlnGlnGlnGlyArgGlnSerVal-339
343-LysAlaLeuArgAspGluGlyGluLysAlaArgLysGlnValLeu-357
368-AlaThrAlaGluGluValLeuGlu-375
381-LeuThrAsnLysLeuLeuHisSerProThrGlnThrLeuAsnLysAlaGlyGluGluAspLysAspLeuVal
-404

Hydrophilic Regions - Hopp-Woods
16-SerIleArgGluLysLeuAla-22
30-LysAlaValArgAsnLeuAlaArgSerAsnAlaAla-41
59-GlyAspSerGluGluIleIle-65
75-ProIleGluGluIleArg-80
87-AspMetGlnGluThrValArgHis-94
115-GlnIleLysAspAlaValArgValAlaGlnGluGlnGluSerMetGlyLysLysLeu-133
142-SerValAlaLysGluValArgThrAspThrAlaValGlyGluAsnSerVal-158
210-ThrLeuAlaArgAlaGlnGluLeuCysAsp-219
257-GlyMetValGluArgAlaLeuLysGlnArgGlnSer-268
277-AlaValProArgAspIleGluAlaGluValGlyAspLeuAsn-290
305-GlnSerGlyLysGluAlaArgGlnLysAlaAlaAlaAla-317
321-LeuValSerGluLysValAlaGluPheValArg-331
333-GlnGlnGlyArgGlnSer-338
343-LysAlaLeuArgAspGluGlyGluLysAlaArgLysGlnValLeu-357
368-AlaThrAlaGluGluValLeuGlu-375
392-ThrLeuAsnLysAlaGlyGluGluAspLysAspLeuVal-404
624
AMPHI Regions - AMPHI
14-LeuLeuLeuGlyIleIleGlyIlePheLeuPro-24
45-ArgPheTyrArgTrpLeuHisArg-52
58-ProMetValHisAsn-62
92-PheProGlnArgTrpTrpValGlyAla-100
102-SerSerValPheCysSerLeuValAlaIle-111

Antigenic Index - Jameson-Wolf
41-LysAlaSerProArgPheTyr-47
50-LeuHisArgHisArgTyrPheGlyPro-58
63-TrpGluGlnAsnGlyAlaValProArgLysAlaLys-74
115-ArgArgProGluSer-119

Hydrophilic Regions - Hopp-Woods

67-GlyAlaValProArgLysAlaLys-74
115-ArgArgProGluSer-119
625
AMPHI Regions - AMPHI
25-SerGlyArgIleIleSerIleAlaAla-33
64-LysMetProProGluMetValTyrArgAla-73

Antigenic Index - Jameson-Wolf
5-ArgLysMetLysLysMetThrMetCysThrArgArgVal-17
57-ProPheLysSerProGlnThrLysMetProPro-67
73-AlaSerSerSerArgMetLysGly-80
96-AspAlaProLysThrLysLeuAsnGlyMetArgLysSerAsnValGln-111

Hydrophilic Regions - Hopp-Woods
5-ArgLysMetLysLysMetThrMetCysThrArgArgVal-17
60-SerProGlnThrLysMetProPro-67
74-SerSerSerArgMetLysGly-80
96-AspAlaProLysThrLysLeuAsnGlyMetArgLysSerAsnValGln-111
627-2
AMPHI Regions - AMPHI
52-TrpHisHisHisTyrGlyLysIleThrAlaPheTrpThrLeuLeuPheLeu-68
83-ThrValAlaHisAlaLeu-88
128-ValGlyThrAlaLeuAlaSerIleMetGly-137
173-IleGlyGlyGlyLeuThrPro-179
189-PheLeuLysGlyValAsp-194
245-AlaIlePheGlyLysTrp-250
258-ValValGlyAlaVal-262
284-LeuGlnAsnLeuVal-288
319-IleAlaGluValGlyLysLeuPheLeuGlyIlePheIleThrIlePheProValLeuSerIleLeuLysAla
GlyGluAlaGlyAlaLeuGlyGlyValValSerLeuValHisAspThrAlaGlyHisProIle-363
372-GlyIleLeuSerAlaPheLeuAspAsnAla-381
404-PheHisSerLeuLeuAlaValSer-411
416-PheMetGlyAlaLeuThrTyrIleGlyAsnAlaProAsnPheMetValLys-432
444-ThrPhePheGlyTyr-448

Antigenic Index - Jameson-Wolf
20-AspLeuAspGlyAlaAsn-25
114-AspLeuAsnGlyThrProLysLeu-121
149-LeuLeuLysAlaAsnGlnAsnArgThrArgArgVal-160
172-AsnIleGlyGlyGly-176
178-ThrProLeuGlyAspProPro-184
223-ArgPhePheLysGlnGluSerIleAlaGlnAspThrProAlaGlnGlnGluLysProGluLys-243
266-GlyLeuTrpLysProGluHisProGlyPhe-275
304-ThrProLysGlnValArgAlaGlyAsnGluPheAsnPhe-316
357-AspThrAlaGlyHis-361
391-AlaGlyGlyAspAla-395
433-AlaIleAlaGluGlnArgGlyValPro-441

Hydrophilic Regions - Hopp-Woods
153-AsnGlnAsnArgThrArgArgVal-160
228-GluSerIleAlaGln-232
234-ThrProAlaGlnGlnGluLysProGluLys-243
268-TrpLysProGluHisProGly-274
306-LysGlnValArgAlaGlyAsn-312
433-AlaIleAlaGluGlnArgGlyVal-440

628
AMPHI Regions - AMPHI
10-CysGlyProProAsnSerCysValSerMetLeuAlaAlaPheSerAspGlyThrSerAlaProAlaAla-32
34-GlnThrTrpIleLeuArgSer-40

Antigenic Index - Jameson-Wolf
6-LysProAlaGlyCysGlyProProAsnSer-15
23-PheSerAspGlyThrSerAla-29
40-SerValLysArgLeuAsnThrAsnArgProArgLeuLysSerSerAla-55
77-MetAlaAsnGlySerAlaSerThr-84
91-GlyArgValArgSerAlaValHisLysProAspTrpIleArgLeuArgArgThrSerSerProLeuLys-113

Hydrophilic Regions - Hopp-Woods
40-SerValLysArgLeuAsnThrAsnArgProArgLeuLysSerSerAla-55
91-GlyArgValArgSerAlaValHisLys-99
101-AspTrpIleArgLeuArgArgThrSerSer-110
629
AMPHI Regions - AMPHI
32-ArgTrpSerAspValPheSer-38
48-IleSerArgLeuProArgThrPhe-55
116-ValAlaAlaLeuIleGlyMetLeu-123
146-IlePheGlyGlyValIleGluAlaValAlaThr-156
167-MetLeuGlyValTrpGlnGlnGlyAsp-175
206-IleLeuGlyLeuGlyGlu-211
252-ValValProAsnIleIleSerArgLeuMetGlyAspArgLeuArgGlnSer-268
285-IleIleGlyArgVal-289
300-ThrValPheGlyValLeu-305

Antigenic Index - Jameson-Wolf
38-SerLeuSerAspSerGln-43
50-ArgLeuProArgThr-54
77-AsnArgPheValGluProSerMetValGlyAlaSerGln-89
130-ArgArgLeuProProThrAla-136
260-LeuMetGlyAspArgLeuArgGlnSer-268

Hydrophilic Regions - Hopp-Woods
260-LeuMetGlyAspArgLeuArgGln-267
630-2
AMPHI Regions - AMPHI
6-PheLeuGluLysIleGluPro-12
23-TrpTyrAlaLeuTyrGlu-28
64-LeuPheProAlaMetPheTyrGlyMetTyrAsn-74
87-LeuLeuGlnGlnAsnIleAlaAsnAspTrpHisTyrAlaPhe-100
137-GlyPheTrpGluValLeuPheAla-144
190-PheGlyGlyThrGlyLysAsnPhe-197
224-AlaValAspGlyTyrSerGlyAlaThrAlaLeuAlaGlnTrp-237
242-AlaAspGlyLeuLysAsnAlaVal-249
258-AspAlaPheIleGlyLysLeuProGlySerIleGlyGluValSer-272
285-PheAlaArgIleAlaSerTrpArgIleIleAlaGlyValMet-298
302-IleAlaMetSerSerLeuPheAsnPhe-310
344-ValSerAlaSerPheThrAsnValGlyLysTrpTrpTyrGlyAlaLeuIleGlyValMetCysValLeuIle
ArgVal-369
382-IleLeuPheAlaAsnLeuPheAlaProIlePheAspTyrPhe-395

Antigenic Index - Jameson-Wolf

6-PheLeuGluLysIleGlu-11
16-ProGlyGlyLysHisGluLys-22
37-SerGlyAlaValThrArgLysAlaAlaHisValArgAspAlaLeuAspSerLysArgMet-56
107-AsnMetSerSerGluAlaGlyValSerAspLysMet-118
146-ValArgLysHisGluIleAsnGlu-153
189-ValPheGlyGlyThrGlyLysAsnPheMet-198
212-TyrProAlaAsnLeuSerGlyAspAla-220
241-GlyAlaAspGlyLeuLys-246
264-LeuProGlySerIleGly-269
312-GlySerAspThrAsnAla-317
400-AsnIleLysArgArgLysAlaArgSerAsnGly-410

Hydrophilic Regions - Hopp-Woods
6-PheLeuGluLysIleGlu-11
18-GlyLysHisGluLys-22
39-AlaValThrArgLysAlaAlaHisValArgAspAlaLeuAspSerLysArgMet-56
108-MetSerSerGluAlaGlyValSerAsp-116
146-ValArgLysHisGluIleAsn-152
400-AsnIleLysArgArgLysAlaArgSerAsnGly-410
638
AMPHI Regions - AMPHI
30-IleValAspIleValGluHis-36
46-AspIleValGluTyrPheGluProLeuGlyLys-56
108-ProPheGlyAsnValValAlaAspAspLeuArgThrGly-120
148-ArgIleGlyArgThrMet-153
198-GluArgTyrValArgArgValTyrGlyTyrGlyThrPro-210
212-ProValAlaPheAspGlyCysGlyThrValGlyArg-223
242-SerGlnPheGluArgIleAlaArgProGly-251

Antigenic Index - Jameson-Wolf
43-AlaAspGlyAspIle-47
53-ProLeuGlyLysHisGln-58
81-ValAspGlyGluThrGlnIle-87
99-AlaGlyIleGlyLysAsnAlaVal-106
113-ValAlaAspAspLeuArgThrGlyCysValProAsnGly-125
135-GlnSerArgValAlaAsp-140
156-TyrAlaAspArgIleIle-161
168-AsnGlnGlyAlaArgGlySerPhe-175
178-IleAsnThrGlyIleHis-183
188-HisThrGlyThrGlyAsnGlyGlnValAlaGluArgTyrValArg-202
205-TyrGlyTyrGlyThr-209
216-AspGlyCysGlyThrValGlyArgProPheAsnArgAsnArgPheVal-231
240-AlaGlySerGlnPheGluArgIleAlaArgProGlyAlaGlyLysCysGly-256

Hydrophilic Regions - Hopp-Woods
43-AlaAspGlyAspIle-47
81-ValAspGlyGluThrGlnIle-87
113-ValAlaAspAspLeuArgThr-119
136-SerArgValAlaAsp-140
195-GlnValAlaGluArgTyrValArg-202
243-GlnPheGluArgIleAlaArgProGlyAlaGly-253
639-1
AMPHI Regions - AMPHI
95-TyrLysAsnAsnArg-99
137-LeuLysValPheAspAsnIle-143

157-ValAsnTyrSerAspIleHisAspAsnIleIleAsnLysAla-170
181-TyrAspLysLeuPheAlaAsnHisPheGlu-190
269-AlaProValSerArg-273
290-GlnPheProAlaValLeuProGly-297
322-AspGluLeuLeuLysGluValGlu-329

Antigenic Index - Jameson-Wolf
13-GluGluThrAlaPro-17
23-HisAsnAsnIleLeuAspAsnSer30
41-AlaMetValArgGluAsnLysIleValGly-50
52-AlaThrLeuArgValAsnGluArgGlyAsnGly-62
75-GlyAsnAspIleSerLysGlyArgAspGlyIlePheSerAsnThrSerThrHisAsnThrTyrLysAsnAsnA
rgPheSerAsp-102
111-TyrThrAsnAspSerGluIleSerGly-119
121-IleSerValGlyAsnAsn-126
135-GluArgLeuLysVal-139
145-ValGlySerArgAspGlnGlyIle-152
160-SerAspIleHisAspAsnIleIleAsnLysAlaGlyLys-172
203-GluGlyThrSerLeuHisAspAsnSerPheIleAsnAsnGluSerGlnValLysTyrVal-222
228-AspTrpSerGluGlyGlyHisGlyAsnTyrTrpSerAspAsnSerAla-243
246-LeuAsnGlyAspGlyPheGlyAspSerAlaTyrArgProAsnGlyIleIle-262
297-GlyGlyValValAspSerLysProLeuMetLysProTyrAlaProLysIleGlnThr-315
318-GlnAlaMetLysAspGluLeuLeuLysGluValGluThrArgGlnSerGluTrpGlyArgAlaGluAsnGly
SerLeuAsn-344

Hydrophilic Regions - Hopp-Woods
41-AlaMetValArgGluAsnLysIleValGly-50
52-AlaThrLeuArgValAsnGluArgGlyAsn-61
77-AspIleSerLysGlyArgAspGlyIle-85
95-TyrLysAsnAsnArgPheSerAsp-102
113-AsnAspSerGluIleSerGly-119
135-GluArgLeuLysVal-139
146-GlySerArgAspGlnGly-151
299-ValValAspSerLysProLeuMet-306
318-GlnAlaMetLysAspGluLeuLeuLysGluValGluThrArgGlnSerGluTrpGlyArgAlaGluAsnGly
Ser-342
640-2
AMPHI Regions - AMPHI
6-SerIleLeuLysSerIleGlyIle-13
22-SerIleLysArgMetSer-27
47-LeuProAlaTyrAlaGluArgLeuProAspPheLeuAlaLysIleGlnPro-63
72-ArgTyrGlyLysPro-76
127-AlaLysLeuValAspHisHis-133
141-IleProHisLeuProAlaProGlyArgAlaIle-151
153-SerAsnTrpLeuProAla-158

Antigenic Index - Jameson-Wolf
24-LysArgMetSerAlaPheArgAlaArgIle-33
50-TyrAlaGluArgLeuProAspPhe-57
59-AlaLysIleGlnProSerGluIleProGlyAlaAspArgTyrGlyLysProGluGlyLysProMetVal-
82
84-ArgValTyrLysGlyAspGluGlnLeu-92
101-AlaValAsnThrArgGlyTyrSerSerLysProIleAsp-113
128-LysLeuValAspHisHisGlu-134
144-LeuProAlaProGlyArgAlaIleArg-152

168-AsnArgLeuArgLeuLysGlyLeuPro-176
178-ValProGlnProSerLysAlaThrGly-186

Hydrophilic Regions - Hopp-Woods
24-LysArgMetSerAlaPheArgAlaArgIle-33
50-TyrAlaGluArgLeuPro-55
68-ProGlyAlaAspArgTyrGlyLysProGluGlyLysProMetVal-82
85-ValTyrLysGlyAspGluGlnLeu-92
128-LysLeuValAspHisHisGlu-134
146-AlaProGlyArgAlaIleArg-152
168-AsnArgLeuArgLeuLysGly-174
180-GlnProSerLysAlaThrGly-186
642-2
AMPHI Regions - AMPHI
157-IleLysHisIleValArgAlaPhe-164
179-GlyValSerAlaPheLysThrLeuArgThrGlnGluPheLeuGlnHisLeuArgGlyGlyVal-199
202-PheArgGlyGluGly-206
208-AspAspValArgLeu-212
228-AspValAlaValLysAsnLeuGlyAsnLeuMetAlaAlaProAsp-242
259-PheGlnIlePheLysAspValPheHisAsnAlaValArgHisAlaAspGlnLeuGln-277
311-ValAspGlyValThrAspGlyAla-318
337-GlnValAspAspPheGlyGluPheAlaValPhe-347
366-PheArgGlyValAsp-370
409-HisLeuGlnThrLeuArgAspLeuArgPheIleAlaGluLeuLeuGlnTrpLeuGlnHisGlnArgAlaPhe
AspAlaGlyThr-436
445-ProArgAsnProGlnAsp-450

Antigenic Index - Jameson-Wolf
1-MetArgHisProProGlnSerAlaAlaLeu-10
17-LeuLeuHisArgProLysSerValCysArgArgArgLysCysArgLeuLysAla-34
36-ProLeuSerAspGlyIleAlaCys-43
63-ValGlnGlnGluGlyCysGly-69
75-LeuTyrGluAspLysGluSerGlyAspAspPheAlaAspLysAspPheLeuGln-92
104-GluAlaAlaAspValPheArg-110
115-AlaGlyAspGlyGlyLysAlaGly-122
144-PheGlyGlyGlyAlaAspLysLeu-151
164-PheLysAsnArgGluGlyAlaAspValAspSerAspIleAlaGly-178
184-LysThrLeuArgThrGlnGlu1-190
202-PheArgGlyGluGlyPheAspAspValArgLeu-212
217-GlyAspGlyGlyAsnArgArgAsnGlyMetAla-227
249-AspGluPheAspVal-253
271-ArgHisAlaAspGlnLeuGlnAlaAlaAlaAspLysAspValLeuGluArgAlaGlnThrGly-291
300-HisGlyGlyCysArg-304
306-PheGlyIleAspAlaValAspGlyValThrAspGly-317
331-CysPheGlyAspGluGlnGlnValAspAspPheGly-342
350-PheGlyGlyAsnGluGluGluValAlaLeu-359
369-ValAspValAsnGly-373
387-CysAsnArgArgAlaGlyGlyPhe-394
396-PheGlyAsnThrGln-400
411-GlnThrLeuArgAspLeuArgPhe-418
430-ArgAlaPheAspAlaGlyThrGlnArgAsnGly-440
443-ValMetProArgAsnProGlnAspPheLeuAsp-453
468-GluGlyGlnGlnGlnThrArg-474

Hydrophilic Regions - Hopp-Woods

1-MetArgHisProPro-5
17-LeuLeuHisArgProLysSerValCysArgArgArgLysCysArgLeuLysAla-34
75-LeuTyrGluAspLysGluSerGlyAspAspPheAlaAspLysAspPheLeu-91
104-GluAlaAlaAspValPheArg-110
117-AspGlyGlyLysAla-121
147-GlyAlaAspLysLeu-151
164-PheLysAsnArgGluGlyAlaAspValAspSerAspIle-176
184-LysThrLeuArgThr-188
205-GluGlyPheAspAspValArgLeu-212
217-GlyAspGlyGlyAsnArgArgAsnGlyMet-226
249-AspGluPheAspVal-253
271-ArgHisAlaAspGlnLeuGlnAlaAlaAspLysAspValLeuGluArgAlaGlnThr-290
310-AlaValAspGlyValThrAspGly-317
331-CysPheGlyAspGluGlnGlnValAspAspPheGly-342
352-GlyAsnGluGluGluValAlaLeu-359
387-CysAsnArgArgAlaGly-392
412-ThrLeuArgAspLeuArgPhe-418
435-GlyThrGlnArgAsnGly-440
446-ArgAsnProGlnAsp-450
468-GluGlyGlnGlnGln-472

644-2

AMPHI Regions - AMPHI
13-MetAspThrAlaAlaPheLeuLysHisIleGluSerAlaPheArgArgIlePheSerAspGlyIleAspLeuM
etArgTyrLeu-40
69-GlnPheGluIleGlnGluValLeuArgIleAlaGly-80
99-GlnProLeuGlnGluPheGlyAsp-106
139-ArgGluMetGlnSerTyrTyrGluTyrIleAspGly-150
160-TyrTrpGlnGlyAsn-164
182-LeuAlaLysValIleAspLeuLeu-189
234-AlaGlyLeuArgAlaPheGlnAsn-241
253-MetThrHisGlyIleMetGluTyrIleLeuGluAsnLeuGluArgTyrValArgAsn-271
291-GluIleLeuTyrArgTyrValCysHis-299

301-ValSerProValAlaProValAlaHis-309
314-AlaAsnIleValLysThrLeuAla-321
330-GlnMetLeuGlnLys-334
357-PheThrIlePheGluGlyProAsn-364

366-MetLeuTyrAlaGluIleTyrAspGlnPheValArgAla-378
397-AspArgLeuGlnThr-401
414-LeuProGluAspIleArgSerPhe-421
439-GlyLysIleIleAlaArgLeu-445

Antigenic Index - Jameson-Wolf
3-HisThrGluProSerAlaGlnProSerThrMetAsp-14
22-IleGluSerAlaPhe-26
29-IlePheSerAspGlyIleAsp-35
40-LeuProGluAspLysTrpLeu-46
57-PheLeuAspLysLysTyrGlyGlyArgLysGlySerGlnPheGluIle-72

103-GluPheGlyAspGluAlaGlnVal-110
118-PheLysGlyGluGlyGlyGlyLeuGly-126

128-ThrGluProGluThrSerGly-134
136-AlaIleAlaArgGluMetGlnSer-143

145-TyrGluTyrIleAspGlyGlnThr-152
160-TyrTrpGlnGlyAsnSerGlnSerAspPhe-169
174-AlaLysGluArgLysAsnGlyLysLeuAlaLys-184
193-LysThrTyrIleArg-197

199-GluThrLeuAlaSerGluGlyLeuArg-207
212-AlaValAsnArgIleAspAlaGluMet-220
228-LeuSerGlnSerAspAlaAlaGly-235
264-AsnLeuGluArgTyrValArgAsnAspIleLysPheValAspTyrGluArgArgGluIleArgArgArgHis
GlnVal-289
339-LysGlyPheGluArgGlyHisThrAlaGlyAsn-349
361-GluGlyProAsnAspMetLeu-367
378-AlaThrAlaGluGluLysGluAlaGlyMetLysLeuAspLysAsnGlnThrLeuLeuAspArgLeuGlnThr
AspAlaArgPhe-405
407-AlaValAlaArgAspTyrThrLeuProGluAspIleArgSerPheLeu-422
451-AlaLysHisGluAspThrAla-457
463-AspIleArgLysAspIleLeuAspCysArgTyrCysGly-475

Hydrophilic Regions - Hopp-Woods
22-IleGluSerAlaPhe-26
29-IlePheSerAspGlyIleAsp-35
40-LeuProGluAspLysTrpLeu-46
58-LeuAspLysLysTyrGlyGlyArgLysGlySerGln-69

103-GluPheGlyAspGluAlaGlnVal-110
118-PheLysGlyGluGlyGly-123
128-ThrGluProGluThrSerGly-134

136-AlaIleAlaArgGluMetGlnSer-143
174-AlaLysGluArgLysAsnGlyLysLeuAlaLys-184
212-AlaValAsnArgIleAspAlaGluMet-220
229-SerGlnSerAspAlaAlaGly-235
264-AsnLeuGluArgTyrValArgAsnAspIleLysPheValAspTyrGluArgArgGluIleArgArgArgHis
GlnVal-289
339-LysGlyPheGluArgGlyHisThr-346
378-AlaThrAlaGluGluLysGluAlaGlyMetLysLeuAspLysAsnGlnThrLeuLeuAspArgLeuGlnThr
AspAlaArgPhe-405
416-GluAspIleArgSerPheLeu-422
451-AlaLysHisGluAspThrAla-457
463-AspIleArgLysAspIleLeuAsp-470
645-2
AMPHI Regions - AMPHI
21-AsnThrLeuAsnArgCysCysLys-28
87-ArgThrLeuProSerLeuLysGlyLeuThrLys-97

Antigenic Index - Jameson-Wolf
17-ValGluGlnSerAsnThrLeuAsnArgCysCysLysLysSerArgMetThrCysSerSerSerArgSerArgS
erCysProCys-44
47-ProMetArgAlaSerGlySerArgValSerSerArgSerArgIle-61
68-SerLeuCysArgLysAsnThrCysProProArgLeuSerSerArgAsnThrAlaSerArgThrLeuProSerL
eu-92
99-LeuThrAlaArgArgArgLeuGly-106
110-IleSerGluLysSerArgSerProSerAsn-119
137-ThrLeuAlaArgArgArgLeuSerCysSer-146

Hydrophilic Regions - Hopp-Woods
19-GlnSerAsnThrLeu-23
25-ArgCysCysLysLysSerArgMetThrCysSerSerSerArgSerArgSerCysPro-43
48-MetArgAlaSerGlySerArgValSerSerArgSerArgIle-61
69-LeuCysArgLysAsnThrCys-75
77-ProArgLeuSerSerArgAsnThrAlaSerArgThr-88
99-LeuThrAlaArgArgArgLeuGly-106
110-IleSerGluLysSerArgSerProSer-118
137-ThrLeuAlaArgArgArgLeuSer-144
647
AMPHI Regions - AMPHI
38-GlyLysValCysArgCysPheGluGlnVal-47
69-ThrValPheArgGlnIleIleSerIleVal-78

Antigenic Index - Jameson-Wolf
26-GlyLeuValLysGluArgAlaArg-33
39-LysValCysArgCysPhe-44
54-GlyThrValGlyGlnThrGluArgGlyThr-63
81-AlaAspAlaGluArgThrAlaAlaHisSerArgGlyThrArgGly-95

Hydrophilic Regions - Hopp-Woods
26-GlyLeuValLysGluArgAlaArg-33
56-ValGlyGlnThrGluArgGlyThr-63
81-AlaAspAlaGluArgThrAlaAlaHisSerArgGlyThrArgGly-95
648
AMPHI Regions - AMPHI
7-ArgIleGluArgAlaValArg-13
15-AlaValIleAspValLeuAsnValAsp-23
44-AlaLeuAlaAspIleArgValLeu-51
94-AlaValAspLeuHisAlaValIleLysLeuThrAspThr-106
127-GlnGlyValGluGlnGly-132
147-ArgArgLeuLysHisPheLysGluGlyAsnAlaAlaGlyMetProArgPhe-163
182-AlaArgThrLeuGlyAsnValPheHis-190
194-GlySerGlyIleAspGlyIleGlnThrIleValAlaPheAsnGlnHisThr-210

Antigenic Index - Jameson-Wolf
1-MetAsnArgArgAspAlaArgIleGluArgAlaValArg-13
23-AspAlaProGlySerGlyThrLeuLeuHisGlnArgGlyLysGlnValGlySerArgAsnAspAlaLeuAla-46
65-GlyLysLysArgPheValGlnSerArgAsnLeuValGlyArgLysGlnArgAsn-82
125-MetProGlnGlyValGluGlnGlyCysArgAla-135
143-ThrGlyPheAspArgArgLeuLysHisPheLysGluGlyAsnAla-157
172-ThrAlaAspThrSerGlyIleAspAlaAspAlaArgThr-184
191-AsnArgAlaGlySerGlyIleAspGly-199

Hydrophilic Regions - Hopp-Woods
1-MetAsnArgArgAspAlaArgIleGluArgAlaValArg-13
33-GlnArgGlyLysGlnValGlySerArgAsnAspAlaLeuAla-46
65-GlyLysLysArgPheValGln-71
74-AsnLeuValGlyArgLysGlnArgAsn-82
127-GlnGlyValGluGlnGlyCysArgAla-135
143-ThrGlyPheAspArgArgLeuLysHisPheLysGluGlyAsnAla-157
173-AlaAspThrSerGlyIleAspAlaAspAlaArgThr-184
649-2

AMPHI Regions - AMPHI
8-AlaIleLeuLeuSerAlaIleLeuGlyLeuVal-18
32-ArgAspThrLysHisIleArgLysAlaAsn-41
62-SerGlnGlyAsnVal-66
68-GluLeuArgGluAsnLys-73
76-ArgLysAlaPheArgSerLeuPro-83

Antigenic Index - Jameson-Wolf
1-MetSerValLysLys-5
25-GlyThrSerGluProAlaHisArgAspThrLysHisIleArgLysAlaAsnLys-42
45-LeuHisProGluCysArgLysTyrLeuGluArgArgAlaAla-58
61-ArgSerGlnGlyAsnValGlnGluLeuArgGluAsnLysLysAlaArgLysAlaPheArg-80
85-AlaGluGlnLysIleGlnCys-91
97-AlaPheAspAspPheAspGlyGlySerPheArgArg-108

Hydrophilic Regions - Hopp-Woods
1-MetSerValLysLys-5
25-GlyThrSerGluProAlaHisArgAspThrLysHisIleArgLysAlaAsnLys-42
47-ProGluCysArgLysTyrLeuGluArgArgAlaAla-58
64-GlyAsnValGlnGluLeuArgGluAsnLysLysAlaArgLysAlaPheArg-80
85-AlaGluGlnLysIleGlnCys-91
97-AlaPheAspAspPheAspGlyGlySerPheArgArg-108
650-2
AMPHI Regions - AMPHI
15-SerValCysProGly-19
57-LeuTrpGlyGluLeuArgGln-63
72-ProGluLeuValArgArgHisGlu-79
89-PheAsnArgValIleAsn-94
137-SerGlyLeuTrpGln-141
173-AsnTyrLeuGlnTyrLeuTyrGlyLeuPheGlyAspTrpPro-186
198-AsnValGlyArgAlaIleAsnArgAlaArg-207
218-LeuArgMetProAsnGluThr-224
269-GluAlaIleAlaArgLeuAlaGlyIleThrGlnSer-280
314-SerAsnTyrLeuAsnAlaAlaProAsp-322
341-IleSerThrAlaThrGlyMet-347
349-IleAlaAspIleLysArgLeuAsnAsnLeu-358
376-LysThrLeuGlnThrAlaSerGlu-383
484-AlaAspGluLeuMetGln-489
496-LeuArgArgGlnAlaGlu-501
503-ThrIleSerAlaValIleGlyThrProAspThrValAlaGlu-516
556-AlaSerIleHisArgValVal-562
621-AspThrPheLysSerIle-626
636-AspIleArgArgLeu-640

Antigenic Index - Jameson-Wolf
1-MetSerLysLeuLys-5
24-GlnAsnThrSerSerHis-29
38-LeuAsnSerSerIleLeuAspLeuProProThrLysGlnTyrPhe-52
59-GlyGluLeuArgGlnGlyPheArgMetGlyGluValAsnProGluLeuValArgArgHisGluSerLysPhe-82
92-ValIleAsnArgSerArgProTyr-99
105-AsnGluValLysLysArgAsnMetProAla-114
128-ThrLysAlaLysSerHisValGlyAlaSerGly-138
145-AlaThrGlyArgHisTyrGlyLeuGluLysThrProValTyrAspGlyArgHisAspVal-164

192-TyrAsnTrpGlyGluGlyAsnValGlyArgAlaIleAsnArgAlaArgAlaGlnGlyLeuGluProThrTyr
GluAsnLeuArgMetProAsnGluThrArgAsnTyrVal-228
247-AsnIleSerAspIleAspAsnLysProTyr-256
259-AlaValGluProAspArgProLeuAspAsnGluAlaIleAla-272
296-ProLysSerLysArgLysLeu-302
318-AsnAlaAlaProAspSer-323
332-ProAlaAlaLysThrSerLeuSerAspIleSerThr-343
350-AlaAspIleLysArgLeuAsnAsnLeuAsnGly-360
370-LeuValAlaLysAsnGlyLysThrLeuGlnThrAlaSer-382
388-IleAspIleAspAsnThrProAspThrTyrArgSerAsnMetProAla-403
411-AlaArgIleArgPro-415
428-LeuProGlnLysThrValArgThrGluProAspProLeuValArgIleAlaGlu-445
454-GlnProGlnThrGluLysGlnThrAlaMetProSerGluThrGln-468
477-ProGlnAsnAspMetGlnAlaAlaAspGluLeu-487
491-ValAlaArgAsnAsnLeuArgArgGlnAlaGluGluThrIle-504
509-GlyThrProAspThrValAlaGluHisLysIleSerAlaSerProGln-524
527-AlaAlaAlaAspGlyLysArgArgValArgLeuGluThrArgValAlaLysAlaAlaAspGlyGluAlaGlu
Ile-551
560-ArgValValGluGlyAspThr-566
583-ValAlaAsnAsnIleLysGlyAsnThrIleGlnLysGlyGlnValLeuArg-599
606-AlaGlnThrArgIleGluLysValSerTyrThrAlaArgLysGlyAspThrPheLys-624
634-IleAspAspIleArgArgLeuAsnProAsnLeu-644
647-IleAsnProGlyGlnArgValLysLeu-655

Hydrophilic Regions - Hopp-Woods
1-MetSerLysLeuLys-5
61-LeuArgGlnGlyPheArgMetGlyGluValAsnProGluLeuValArgArgHisGluSerLysPhe-82
92-ValIleAsnArgSerArgPro-98
105-AsnGluValLysLysArgAsnMetProAla-114
128-ThrLysAlaLysSerHisVal-134
150-TyrGlyLeuGluLys-154
156-ProValTyrAspGlyArgHisAspVal-164
202-AlaIleAsnArgAlaArgAlaGlnGlyLeu-211
213-ProThrTyrGluAsnLeuArgMetProAsnGluThrArgAsnTyrVal-228
249-SerAspIleAspAsn-253
260-ValGluProAspArgProLeuAspAsnGluAlaIleAla-272
296-ProLysSerLysArgLysLeu-302
334-AlaLysThrSerLeu-338
350-AlaAspIleLysArgLeuAsn-356
373-LysAsnGlyLysThrLeuGlnThrAlaSer-382
389-AspIleAspAsnThrProAspThrTyrArg-398
411-AlaArgIleArgPro-415
431-LysThrValArgThrGluProAspProLeuValArgIleAlaGlu-445
455-ProGlnThrGluLysGlnThrAlaMetProSerGluThrGln-468
479-AsnAspMetGlnAlaAlaAspGluLeu-487
494-AsnAsnLeuArgArgGlnAlaGluGluThrIle-504
512-AspThrValAlaGluHisLysIleSerAla-521
527-AlaAlaAlaAspGlyLysArgArgValArgLeuGluThrArgValAlaLysAlaAlaAspGlyGluAlaGlu
Ile-551
560-ArgValValGluGly-564
608-ThrArgIleGluLysValSerTyrThrAlaArgLysGlyAspThrPheLys-624
634-IleAspAspIleArgArgLeuAsn-641
649-ProGlyGlnArgValLysLeu-655
652-1
AMPHI Regions - AMPHI

6-AspIlePheAlaArg-10
52-ArgAspGlyAspLys-56
62-LysGlyValLeuLysAlaValGluHisValAsnAsnGlnIleAlaGlnAla-78
130-LeuTyrArgTyrLeuGlyGlyAlaGlyPro-139
149-ValIleAsnGlyGly-153
173-LysSerPheArgGluAlaLeuArgCys-181
184-GluIlePheHisAlaLeuLysLys-191
266-AlaGluPheAlaGluTyrLeuGluGlyLeuValAsn-277
323-AlaGluGlyIleGluLysGlyVal-330
338-ValAsnGlnIleGlyThrLeuSerGluThrLeuLysAlaValAspLeuAlaLys-355
377-AspLeuAlaValAla-381
391-SerLeuSerArgSerAspArgMetAlaLysTyrAsnGlnLeuLeuArgIleGluGlu-409
411-LeuAlaGluAlaAlaAspTyr-417

Antigenic Index - Jameson-Wolf
11-GluIleLeuAspSerArgGlyAsnProThrValGlu-22
36-AlaValProSerGlyAlaSerThrGlyGlnLysGluAlaLeuGluLeuArgAspGlyAspLysSerArgTyrS
erGlyLysGlyValLeuLysAlaValGluHisValAsn-72
83-AspAlaAsnGluGlnSerTyr-89
97-LeuAspGlyThrGluAsnLysGlyAsnLeuGly-107
121-AlaAlaAlaGluAspSerGlyLeuPro-129
135-GlyGlyAlaGlyProMet-140
151-AsnGlyGlyGluHisAlaAsnAsnSer-159
173-LysSerPheArgGluAlaLeuArgCysGlyAla-183
190-LysLysLeuCysAspSerLysGlyPheProThrThrValGlyAspGluGlyGlyPhe-208
211-AsnLeuAsnSerHisLysGluAlaLeu-219
243-CysAlaSerSerGluPheTyrLysAspGlyLysTyrHisLeuGluAlaGluGlyArgSerTyrThrAsn-26
5
283-SerIleGluAspGlyMetAspGluAsnAspTrpGluGly-295
299-LeuThrGluLysLeuGlyGlyArgValGlnLeuValGlyAspAspLeu-314
318-AsnProLysIleLeuAlaGluGlyIleGluLysGlyVal-330
352-AspLeuAlaLysArgAsnArgTyrAla-360
363-MetSerHisArgSerGlyGluThrGluAspSerThrIle-375
388-LysThrGlySerLeuSerArgSerAspArgMetAlaLys-400
405-LeuArgIleGluGluGluLeuAlaGluAlaAlaAspTyrProSerLys-420

Hydrophilic Regions - Hopp-Woods
11-GluIleLeuAspSerArgGlyAsnProThrValGlu-22
43-ThrGlyGlnLysGluAlaLeuGluLeuArgAspGlyAspLysSerArgTyrSerGly-61
63-GlyValLeuLysAlaValGlu-69
97-LeuAspGlyThrGluAsnLysGlyAsnLeu-106
121-AlaAlaAlaGluAspSerGly-127
153-GlyGluHisAlaAsn-157
173-LysSerPheArgGluAlaLeuArgCysGlyAla-183
190-LysLysLeuCysAspSerLysGly-197
202-ValGlyAspGluGlyGlyPhe-208
213-AsnSerHisLysGluAlaLeu-219
247-GluPheTyrLysAspGlyLysTyrHisLeuGluAlaGluGlyArgSerTyrThr-264
283-SerIleGluAspGlyMetAspGluAsnAspTrpGluGly-295
299-LeuThrGluLysLeuGlyGly-305
321-IleLeuAlaGluGlyIleGluLysGlyVal-330
352-AspLeuAlaLysArgAsnArgTyr-359
364-SerHisArgSerGlyGluThrGluAspSerThrIle-375
391-SerLeuSerArgSerAspArgMetAlaLys-400
405-LeuArgIleGluGluGluLeuAlaGluAlaAlaAspTyrProSer-419

653
AMPHI Regions - AMPHI
6-MetArgMetProGluValThrLysGlyPheSerGlySer-18
60-ThrMetArgLysProArgLeuThr-67
75-AlaLeuIlePheThrCysPheAla-82
96-ThrAlaLeuAlaAlaIleThrCysIle-104
111-LeuGlyLysMetGluGluPheAsn-118

Antigenic Index - Jameson-Wolf
4-GluProMetArgMetProGluValThrLysGlyPheSerGlySer-18
45-GlyCysArgSerThrArgLysThr-52
56-ValArgProGluThrMetArgLysProArgLeuThrAsnSerSerAla-71
86-AsnSerGlyCysAsnAla-91
103-CysIleSerGlyProProCysArgLeuGlyLysMetGluGlu-116
125-SerArgHisLysIleThrProProArgGlyProArgArgVal-138
145-ThrLysSerGlnAsnGlyThrGly-152
154-GlyTyrSerProProAlaThrArgProAla-163

Hydrophilic Regions - Hopp-Woods
4-GluProMetArgMetProGluValThrLys-13
47-ArgSerThrArgLysThr-52
57-ArgProGluThrMetArgLysProArgLeuThrAsn-68
107-ProProCysArgLeuGlyLysMetGluGlu-116
126-ArgHisLysIleThrProProArgGlyProArg-136
158-ProAlaThrArgProAla-163
656
AMPHI Regions - AMPHI
14-MetAlaArgThrLeuGlyAlaProGlu-22
42-ArgArgProSerThr-46
92-LeuAlaSerLeuAsnLysSerCys-99
117-MetGlyArgThrIleThr-122

Antigenic Index - Jameson-Wolf
6-GlySerThrSerSer-10
19-GlyAlaProGluSerValProAlaGlyLysValAlaAla-31
40-SerPheArgArgProSerThrLeuGlu-48
74-ArgProThrSerLeuArgProLysSerIleAsn-84
94-SerLeuAsnLysSerCysSerLeuAlaArgSerSerAlaGlyValLeuProArgArgArgValProAla-116
122-ThrSerLeuArgSerArgArgThrArgIleSerGlyGluGluProThrMetTrpLysSerProLysSer-14
4

Hydrophilic Regions - Hopp-Woods
40-SerPheArgArgProSerThr-46
76-ThrSerLeuArgProLysSerIle-83
99-CysSerLeuAlaArgSerSer-105
109-LeuProArgArgArgValProAla-116
124-LeuArgSerArgArgThrArgIleSerGlyGluGluProThrMet-138
140-LysSerProLysSer-144
657

AMPHI Regions - AMPHI
9-ProAlaMetLeuGly-13
20-LeuGlyArgMetPheThr-25
62-AlaAlaLeuAspGluLeuAlaLysCysAlaAla-72
85-MetArgPheLeuAlaLys-90

132-AspIleThrGluAlaSer-137
139-GlnPheLeuProGlyIleLeuLysThr-147

161-LysThrLeuAspGluLeuLysAlaAla-169
178-CysValLeuGluLysMetValAspLeu-186
203-GlnThrPheAspProAlaGluAsnIle-211
232-GlnGlnAlaArgGlnMetAlaGlnArgLeuAlaAspGluLeuAspTyrValGlyValLeu-251
314-AsnIleLeuGlyAsp-318

Antigenic Index - Jameson-Wolf
16-GlyGlyGlyGlnLeuGly-21
37-ValLeuAspProAspProAspAlaProAla-46
62-AlaAlaLeuAspGluLeuAlaLys-69
75-ThrGluPheGluAsnValAsnAlaAspAla-84
91-HisThrAsnValSerProSerGlyAsp-99
106-AsnArgIleGlnGluLysAlaTrpIle-114
128-CysLysAlaGluAspIleThrGluAla-136
150-LeuGlyTyrAspGlyLysGlyGlnIleArgValLysThrLeuAspGluLeuLysAlaAlaPhe-170
182-LysMetValAspLeuArgSerGluIle-190
197-LeuAsnAsnAspAsnValGlnThrPheAspProAlaGluAsnIleHisGluAsnGly-215
230-ValGlnGlnGlnAlaArgGlnMetAla-238
240-ArgLeuAlaAspGluLeuAsp-246
269-IleAlaProArgProHisAsnSerGlyHisHis-279
288-GlnPheGlnGlnGln-292
300-ProProAlaAspThrLysLeuLeuSer-308
319-ValTrpGlnGluAspGlyGlyGluProAspTrp-329
333-GlnSerHisProAsnAla-338
344-GlyLysLysThrAlaHisLysGlyArgLysMetGly-355
361-ThrThrAspSerAspThrAlaPheGlnGluAlaLysLysLeuHis-375

Hydrophilic Regions - Hopp-Woods
37-ValLeuAspProAspProAspAlaProAla-46
62-AlaAlaLeuAspGluLeuAlaLys-69
75-ThrGluPheGluAsnValAsn-81
128-CysLysAlaGluAspIleThrGluAla-136
152-TyrAspGlyLysGlyGlnIleArgValLysThrLeuAspGluLeuLysAlaAlaPhe-170
182-LysMetValAspLeuArgSerGluIle-190
197-LeuAsnAsnAspAsn-201
206-AspProAlaGluAsnIleHis-212
230-ValGlnGlnGlnAlaArgGlnMetAla-238
240-ArgLeuAlaAspGluLeuAsp-246
269-IleAlaProArgProHisAsn-275
301-ProAlaAspThrLysLeu-306
320-TrpGlnGluAspGlyGlyGluProAsp-328
344-GlyLysLysThrAlaHisLysGlyArgLysMetGly-355
362-ThrAspSerAspThrAlaPheGlnGluAlaLysLysLeuHis-375
658
AMPHI Regions - AMPHI
28-ArgGlnTyrAlaAspIleIleGlnPheValArgGlnAlaLeuArgHisLeuProArgLeuLeuLeu-49
68-ValAspValPheGlyArgValGluSer-76
92-ThrAlaGlnIleHisHisPhePheGlnAsnAlaIleHisAla-105
139-GlnLysLeuArgAlaCysPheSerAspValPheSer-150

Antigenic Index - Jameson-Wolf
6-ValArgAlaArgGlyAspPheValAspAspGlnPheMetArgValThrAspAsnLysHisPhe-26

40-AlaLeuArgHisLeuPro-45
53-ThrGlnSerArgGlyAspAspGlyIleSerGlnAspAlaVal-66
72-GlyArgValGluSer-76
107-ValPheGlyLysArgGlyPheGlu-114
130-GlnArgSerArgPheGlnAspAlaGlyGlnLysLeuArgAlaCysPhe-145
155-LeuIleArgArgGlyLeuGlnSerArgPhe-164
177-AsnArgHisThrIleAlaAlaArgGlyAsnIle-187
193-LysAlaHisArgIleGly-198
202-PheLysPheSerGlyHisArgArgAla-210
219-LeuValValLysArgArgAlaGln-226
230-GlyLysPheCysCysArgArgValArgIleGlyValGluAsn-243
250-GlyPheGlyGlyAsnGlyLysHisSerAla-259

Hydrophilic Regions - Hopp-Woods
6-ValArgAlaArgGlyAspPheValAsp-14
16-GlnPheMetArgValThrAspAsnLysHisPhe-26
53-ThrGlnSerArgGlyAspAspGlyIleSer-62
72-GlyArgValGluSer-76
130-GlnArgSerArgPheGlnAspAlaGlyGlnLysLeuArgAlaCysPhe-145
155-LeuIleArgArgGlyLeuGln-161
193-LysAlaHisArgIleGly-198
205-SerGlyHisArgArgAla-210
220-ValValLysArgArgAlaGln-226
233-CysCysArgArgValArgIleGlyVal-241
253-GlyAsnGlyLysHisSerAla-259

661-2
AMPHI Regions - AMPHI
19-GlyIleThrAspLysProPheArgArgLeuCysArgAspPheGlyAlaGly-35
37-AlaValCysGluMetLeu-42
75-AspProGlnGlnMetAlaAspAlaAla-83
122-AlaAlaIleLeuGluAlaValValArg-130
152-ProValIleAlaLysIleAlaGlu-159
256-AlaAlaAlaIleLeuAsnHisIleArgAlaIleHisAlaPheTyrGly-271
297-ArgArgGluIleAsnArgLeuAspSer-305
310-TyrAspMetLeuAlaGlyTyrLeuGluArgLeuAlaGluLys-323

Antigenic Index - Jameson-Wolf
20-IleThrAspLysProPheArgArgLeuCysArgAspPheGlyAlaGly-35
42-LeuThrSerAspProThrLeuArgAsnThrArgLysThrLeuHisArgSerAspPheAlaAspGluGlyGly-
65
72-AlaGlySerAspProGlnGlnMetAlaAspAlaAlaArg-84
97-AsnMetGlyCysProAlaLysLysValCys-106
143-GlyTrpHisAspAspHisGlnAsnLeu-151
157-IleAlaGluAspCysGly-162
169-HisGlyArgThrArgThrGlnMetTyrLysGlyGluAlaArgTyr-183
187-AlaGluThrLysCysArgLeu-193
200-AsnGlyAspIleThrSerProGlnLysAla-209
222-MetIleGlyArgGlyAlaGlnGlyArgProTrpPhe-233
236-AspLeuLysHisTyrAla-241
270-TyrGlyAspThrAlaGly-275
277-ArgIleAlaArgLysHis-282
288-AspGluMetProAspGlyGluGlnThrArgArgGluIleAsnArgLeuAspSerAla-306
319-ArgLeuAlaGluLysThrAspSerTrp-327
330-AlaTyrArgProAsnAla-335

Hydrophilic Regions - Hopp-Woods
20-IleThrAspLysProPheArgArgLeuCysArgAspPhe-32
46-ProThrLeuArgAsnThrArgLysThrLeuHisArgSerAspPheAlaAspGluGlyGly-65
73-GlySerAspProGlnGlnMetAlaAspAlaAlaArg-84
100-CysProAlaLysLysValCys-106
157-IleAlaGluAspCysGly-162
170-GlyArgThrArgThrGlnMetTyrLysGlyGluAlaArgTyr-183
187-AlaGluThrLysCysArgLeu-193
203-IleThrSerProGlnLysAla-209
236-AspLeuLysHisTyrAla-241
277-ArgIleAlaArgLys-281
289-GluMetProAspGlyGluGlnThrArgArgGluIleAsnArgLeuAspSerAla-306
319-ArgLeuAlaGluLysThrAspSer-326
663
AMPHI Regions - AMPHI
19-ProPheAlaLeuLeuHisLysIleAlaAspLeuThrGlyLeuLeuAlaTyr-35
47-IleAsnLeuAlaLysCysPheSerGluTrp-56
66-LysGlnHisPheLysHisMetAlaLysLeu-75
87-AlaGlyArgLeuLysSerLeuValArg-95
168-GluGlyLeuArgAlaLeuValLysGlnPheArgLys-179
209-ThrIleThrGlyLeuSerArgIleAlaAlaLeuAlaAsn-221
243-ProAlaTrpLysSer-247
258-GlnArgMetAsnArgPheIleGluAspArgValArgGluHis-271

Antigenic Index - Jameson-Wolf
38-ValLysProArgArgArgIleGlyGlu-46
56-TrpSerGluGluLysArgLysThrValLeu-65
87-AlaGlyArgLeuLysSer-92
94-ValArgTyrArgAsnLysHisTyrLeuAsp-103
105-AlaLeuAlaAlaGlyGluLys-111
139-TyrSerHisGlnLysAsnLysIleLeuAsp-148
150-GlnIleLeuLysGlyArgAsnArgTyr-158
166-ArgThrGluGlyLeuArgAlaLeu-173
175-LysGlnPheArgLysSerSerAla-182
188-ProAspGlnAspPheGlyArgAsnAspSerVal-198
229-ProValArgGluAlaAspAsnThr-236
243-ProAlaTrpLysSerPheProGlyCluAspAlaLysAlaAspAlaGlnArgMetAsnArgPheIleGluAsp
ArgValArgGluHisProGlu-273
280-LysArgPheLysThrArgProGluGlySerProAspPheTyr-293

Hydrophilic Regions - Hopp-Woods
39-LysProArgArgArgIleGlyGlu-46
56-TrpSerGluGluLysArgLysThrValLeu-65
88-GlyArgLeuLysSer-92
94-ValArgTyrArgAsn-98
105-AlaLeuAlaAlaGlyGluLys-111
142-GlnLysAsnLysIleLeuAsp-148
150-GlnIleLeuLysGlyArgAsnArgTyr-158
166-ArgThrGluGlyLeuArgAlaLeu-173
176-GlnPheArgLysSerSer-181
190-GlnAspPheGlyArgAsnAspSerVal-198
229-ProValArgGluAlaAspAsn-235
248-PheProGlyGluAspAlaLysAlaAspAlaGlnArgMetAsnArgPheIleGluAspArgValArgGluHis
ProGlu-273
280-LysArgPheLysThrArgProGluGlySerPro-290

664-2
AMPHI Regions - AMPHI
47-AlaAspValPheAspAlaAlaHisGlyAlaAlaGly-58
90-ProValValGluIle-94
158-PheHisArgValPheGlnArgPhe-165
201-AlaArgAspGlnSerLysGlnIleAlaArgPheGlyLysArg-214

Antigenic Index - Jameson-Wolf
27-GlyAlaHisArgMetGlyGlyArgAlaCysVal-37
73-PheLeuGlnArgLysLeuGluPro-80
108-IleGlyGlyGlyAlaAlaValGlyLysAspGluLeuGlyValLysAspValGln-125
137-AlaHisGlyAspAspHisGluAsn-144
165-PheHisGlyLysAlaAspLeuGly-172
177-GlyGlyValLysLeuAspPhe-183
199-GlnIleAlaArgAspGlnSerLysGlnIleAlaArgPheGlyLysArgValPhe-216

Hydrophilic Regions - Hopp-Woods
28-AlaHisArgMetGlyGly-33
74-LeuGlnArgLysLeuGluPro-80
113-AlaValGlyLysAspGluLeuGlyValLysAspValGln-125
137-AlaHisGlyAspAspHisGluAsn-144
165-PheHisGlyLysAlaAspLeuGly-172
177-GlyGlyValLysLeuAspPhe-183
199-GlnIleAlaArgAspGlnSerLysGlnIleAlaArgPheGlyLys-213
665-1
Hydrophilic Regions - Hopp-Woods
39-LysProArgArgArgIleGlyGlu-46
56-TrpSerGluGluLysArgLysThrValLeu-65
88-GlyArgLeuLysSer-92
94-ValArgTyrArgAsn-98
105-AlaLeuAlaAlaGlyGluLys-111
142-GlnLysAsnLysIleLeuAsp-148
150-GlnIleLeuLysGlyArgAsnArgTyr-158
166-ArgThrGluGlyLeuArgAlaLeu-173

176-GlnPheArgLysSerSer-181
190-GlnAspPheGlyArgAsnAspSerVal-198
229-ProValArgGluAlaAspAsn-235
248-PheProGlyGluAspAlaLysAlaAspAlaGlnArgMetAsnArgPheIleGluAspArgValArgGluHis
ProGlu-273
280-LysArgPheLysThrArgProGluGlySerPro-290

Antigenic Index - Jameson-Wolf
8-LeuLysAspTyrGlnThrProAlaTyr-16
26-AspIleAsnGluPro-30
32-ThrValValLysSerArgLeuThrValGluProGlnArgValGlyGlu-47
49-LeuValLeuAspGlySerAla-55
80-GlyValProSerGluArgPheThrVal-88
90-ValGluThrGluIleLeuProAlaGluAsnLysSerLeu-102
115-GlnCysGluProGluGlyPheArgLys-123
128-IleAspArgProAspValMetSer-135
142-ValAlaAspLysLysArgTyrPro-149
153-SerAsnGlyAsnLysIleAspGlyGlyGluPheSerAspGlyArgHisTrpValLysTrpGluAspProPhe
SerLysProSer-180
191-AlaValThrGluAspTyr-196

200-MetSerGlyArgAsnValLysIle-207
211-ThrThrGluAlaAspLysProLysVal-219
230-MetLysTrpAspGluThrArgPhe-237
255-AsnMetGlyAlaMetGluAsnLysGlyLeu-264
275-AspSerArgThrAlaThrAspThrAspPheGluGlyIleGlu-288
295-TyrPheHisAsnTrpThrGlyAsnArgValThrCysArgAspTrp-309
313-SerLeuLysGluGly-317
322-ArgAspGlnGluPheSerGlyAspArgAlaSerArgAlaValArgArgIleGluAsn-340
347-HisGlnPheProGluAspAlaGlyProThrAlaHisProValArgProAlaSerTyrGluGluMetAsn-36
9
376-ValTyrGluLysGlyAlaGluVal-383
394-GluGlyPheGlnLysGlyMet-400
404-PheGlnArgHisAspGlyGlnAlaValThrCysAspAspPheArgAlaAlaMet-421
437-SerGlnAlaGlyThrPro-442
444-LeuGluAlaGluGlyArgLeuLysAsnAsnIle-454
459-ValLysGlnThrValProProThrProAspMetThrAspLysGlnPro-474
483-LeuLeuAsnArgAsnGlyGluAlaVal-491
494-AspTyrGlnGlyLysArgAlaThrGlu-502
537-LeuAsnTyrProTyrSerAspAspAspLeu-546
552-HisAspSerAspAla-556
578-LeuSerAspGlyValGluLeuProLysHisGluLysLeu-590
594-ValGluLysValIleSerAspAspLeuLeu-603
614-ValProSerGluAlaGluLeuTrpAspGlyAlaGluAsnIleAspProLeuArg-631
633-HisGlnAlaArgGluAlaLeu-639
652-HisGluLeuAsnArgGlnAlaAlaLysGlnGluAsnGlnSerTyrGluTyrSerProGluAlaAlaGly-67
4
677-ThrLeuArgAsnValCys-682
689-AlaAspProAlaHis-693
696-ThrValAlaGluLysTyrGlyGlu-703
719-AsnGlyAsnGluSerAspThrArgAsnArgLeu-729
733-PheAlaAspLysPheSerAspAspAlaLeuVal-743
752-GlySerSerArgArgSerAspThrLeuGlnGlnVal-763

768-GlnHisProLysPheSerLeuGluAsnProAsnLysAlaArgSer-782
785-GlySerPheSerArgAsnValPro-792
795-HisAlaGluAspGlySerGlyTyrArgPheIleAla-806
808-LysValIleGluIleAspArgPheAsnProGlnVal-819
831-AsnLysLeuGluProHisArgLysAsnLeuVal-841
844-AlaLeuGlnArgIleArgAlaGlnGluGlyLeuSerLysAspValGlyGluIleVal-862

Hydrophilic Regions - Hopp-Woods
32-ThrValValLysSerArgLeuThrValGluProGlnArgValGlyGlu-47
82-ProSerGluArgPheThrVal-88
90-ValGluThrGluIleLeuProAlaGluAsnLysSer-101
116-CysGluProGluGlyPheArg-122
129-AspArgProAspValMetSer-135
142-ValAlaAspLysLysArgTyr-148
154-AsnGlyAsnLysIleAspGlyGlyGluPheSerAsp-165
170-ValLysTrpGluAspProPheSer-177
201-SerGlyArgAsnValLys-206
213-GluAlaAspLysProLysVal-219
230-MetLysTrpAspGluThrArgPhe-237
258-AlaMetGluAsnLysGly-263
275-AspSerArgThrAlaThrAspThrAspPheGluGlyIleGlu-288
313-SerLeuLysGluGly-317

322-ArgAspGlnGluPheSerGlyAspArgAlaSerArgAlaValArgArgIleGluAsn-340
348-GlnPheProGluAspAlaGlyPro-355
363-AlaSerTyrGluGluMetAsn-369
376-ValTyrGluLysGlyAlaGluVal-383
394-GluGlyPheGlnLysGlyMet-400
406-ArgHisAspGlyGln-410
413-ThrCysAspAspPheArgAlaAlaMet-421
444-LeuGluAlaGluGlyArgLeuLysAsnAsnIle-454
467-ProAspMetThrAspLysGlnPro-474
495-TyrGlnGlyLysArgAlaThrGlu-502
541-TyrSerAspAspAspLeu-546
552-HisAspSerAspAla-556
580-AspGlyValGluLeuProLysHisGluLysLeu-590
594-ValGluLysValIleSer-599
616-SerGluAlaGluLeu-620
622-AspGlyAlaGluAsnIleAspPro-629
633-HisGlnAlaArgGluAlaLeu-639
652-HisGluLeuAsnArgGlnAlaAlaLysGlnGluAsnGlnSer-665
689-AlaAspProAlaHis-693
696-ThrValAlaGluLysTyrGlyGlu-703
719-AsnGlyAsnGluSerAspThrArgAsnArgLeu-729
733-PheAlaAspLysPheSerAsp-739
753-SerSerArgArgSerAspThr-759
776-AsnProAsnLysAlaArgSer-782
795-HisAlaGluAspGlySerGly-801
808-LysValIleGluIleAspArgPheAsn-816
831-AsnLysLeuGluProHisArgLysAsnLeuVal-841
844-AlaLeuGlnArgIleArgAlaGlnGluGlyLeuSerLysAspValGlyGluIleVal-862
666-2
AMPHI Regions - AMPHI
89-GlyTyrAspIleLeuLysGlnGlyGlySer-98
162-LeuLysPheMetGluAla-167
177-ProAlaIleProLysLeuMetGluThrIleHisGln-188
193-LeuProTrpGlyLysLeuPheAspThrProIleArg-204
227-LeuAlaArgTyrProLys-232
249-LeuLeuLysAsnLeuGluPheAlaAspSerValGlnAlaLeu-262
265-GlnGlyAlaLysAlaLeuHisThr-272
274-LysTyrAlaGlnAsnIleValSerValVal-283
295-LeuGlnAspLeuSerAspTyrGln-302
313-TyrArgIleTyrGluValCysGlyMetGly-322
332-GlyGlnIleLeuGlyIleLeuAsnGluPheSer-342
353-LeuArgLeuLeuGlyAsp-358
411-AspPheIleHisGluTrp-416
424-LeuProSerThrSerHis-429
433-ValAspLysAlaGlyAsn-438
441-SerMetThrThrSerIleGluAsnAlaPheGlySer-452
511-ProGlyGlySerArgIleIleGlyTyrValAlaLys-522
537-AlaIleSerAlaProAsnLeuLeuAsnArgPheGly-548
562-GlnGlnAlaLeuAsnAsp-567
590-ArgLeuValGlyGly-594

Antigenic Index - Jameson-Wolf
5-AsnHisGlnSerAsnSerGlyGluGlyValLeu-15
40-AsnGlnGlyLysValAsnThr-46
54-AlaAspAlaHisThrProGluHisAlaThr-63

65-LeuThrGluGlnLysGln-70
92-IleLeuLysGlnGlyGlySerAlaAla-100
114-GluProGlnSerSerGlyLeuGlyGly-122
130-AspAsnThrAlaLysThr-135
137-ThrThrPheAspGlyArgGluThrAlaPro-146
154-PheLeuAspLysAspGlyGlnPro-161
169-ValGlyGlyArgSerValGly-175
197-LysLeuPheAspThrProIleArgLeuAlaLysGlnGlyPhe-210
212-ValSerProArgLeu-216
221-GluGlnAsnGlnGlnHis-226
228-AlaArgTyrProLysThrAlaAla-235
271-HisThrGlyLysTyr-275
284-GlnAsnAlaLysAspAsnProGlyGln-292
296-GlnAspLeuSerAspTyrGlnValValGluArgProProValCys-310
320-GlyMetGlyAlaProSerSerGlyGly-328
340-GluPheSerProAsnGlnValGlyTyrAspAlaGluGlyLeuArgLeuLeuGlyAspAlaSerArg-361
363-AlaPheAlaAspArgAspValTyrLeuGlyAspProAspPheVal-377
384-LeuIleSerLysAspTyrLeuLysHisArgSerGlnLeuLeuGluGlnSerAspLysAlaLeu-404
431-SerIleValAspLysAlaGly-437
445-SerIleGluAsnAlaPhe-450
472-ProIleLysGlnGlyLysGlnValAlaAsnArgValGluProGlyLysArgProArgSerSerMet-493
500-LysAlaGlyLysProTyrMet-506
510-SerProGlyGlySerArgIle-516
548-GlySerTyrGluLeuGluThrGlyThr-556
566-AsnAspLeuGlyTyrLysThrAspValArgGluLeuAsnSerGlyVal-581
587-GluProSerArgLeuValGlyGlyAlaAspProArgArgGluGlyArgValMetGlyAsp-606

Hydrophilic Regions - Hopp-Woods
8-SerAsnSerGlyGlu-12
40-AsnGlnGlyLysValAsnThr-46
55-AspAlaHisThrProGluHis-61
65-LeuThrGluGlnLysGln-70
96-GlyGlySerAlaAla-100
139-PheAspGlyArgGluThrAlaPro-146
154-PheLeuAspLysAspGlyGlnPro-161
203-IleArgLeuAlaLysGlnGlyPhe-210
284-GlnAsnAlaLysAspAsnProGly-291
302-GlnValValGluArgProPro-308
348-TyrAspAlaGluGlyLeuArgLeuLeuGlyAspAlaSerArg-361
363-AlaPheAlaAspArgAspValTyrLeuGly-372
388-AspTyrLeuLysHisArgSerGlnLeuLeuGluGlnSerAspLysAlaLeu-404
432-IleValAspLysAlaGly-437
472-ProIleLysGlnGlyLysGlnValAlaAsnArgValGluProGlyLysArgProArgSerSerMet-493
572-ThrAspValArgGluLeuAsnSer-579
595-AlaAspProArgArgGluGlyArgValMetGlyAsp-606
667-2
AMPHI Regions - AMPHI
6-GlyLeuCysGlyGlnValIlePro-13
48-IleIleAlaAspPheLeuGlnProAlaArg-57
59-GluCysLeuProAsnLeuAlaAla-66
74-LysThrAlaGlnPhe-78
115-IleAlaAlaValAlaGluIle-121
153-ThrAspGlnLeuArgArgMetPhePheAsnGlnPheGluLysPheSerAsnAspHis-171
202-LysMetMetLeuHisLys-207
234-ValGlnCysSerAspThr-239

Antigenic Index - Jameson-Wolf
27-ProAlaAlaAspGlnThrGluThrGln-35
56-AlaArgMetGluCysLeuPro-62
71-LeuAlaArgLysThrAlaGln-77
89-ArgLeuValLysArgGluGlnIle-96
152-ProThrAspGlnLeuArg-157
165-GluLysPheSerAsn-169
190-ProThrHisAlaAlaArgAsnArgHisAsnLeu-200
226-ValGlyGlnArgGlyArgGlnLeu-233
248-IleGluSerGlnAsnArgGlyHisAspSer-257

Hydrophilic Regions - Hopp-Woods
27-ProAlaAlaAspGlnThrGluThrGln-35
56-AlaArgMetGluCys-60
71-LeuAlaArgLysThrAlaGln-77
89-ArgLeuValLysArgGluGlnIle-96
165-GluLysPheSerAsn-169
192-HisAlaAlaArgOAsnArgHisAsnLeu-200
228-GlnArgGlyArgGln-232
250-SerGlnAsnArgGlyHisAsp-256
669-2
AMPHI Regions - AMPHI
24-PheLeuGlyIleLysArgPhePheArgGlnPro-34
60-LysLeuHisArgAlaPhe-65
95-GlnIlePheArgHisValGlnSer-102
119-ThrArgGlnAlaPhe-123

Antigenic Index - Jameson-Wolf
5-ArgLeuGlnAsnGlyArgThrGlyArgAsnProProPheValGlnLysArgLeuAsp-23
29-ArgPhePheArgGlnProLeuGluMetArgArgIleIleLysLysHisGlnProIleAsnAla-49
69-GlyArgLysArgProHisHisHisAspSerSerLeuArgArgGlnHisGlyIleGluGlyMetGlyPhe-91
99-HisValGlnSerSerAsnArgGlnAsnGlyArgGlnProVal-112
114-AlaProAsnArgGlnThrArgGlnAlaPhe-123
137-ProThrSerAsnGlyTyrCys-143
149-SerThrHisArgThrThrHisLysAlaProProTyr-160

Hydrophilic Regions - Hopp-Woods
7-GlnAsnGlyArgThrGlyArgAsn-14
18-ValGlnLysArgLeuAsp-23
34-ProLeuGluMetArgArgIleIleLysLysHisGlnPro-46
69-GlyArgLysArgProHisHisHisAspSerSerLeuArgArgGlnHisGly-85
101-GlnSerSerAsnArgGlnAsnGlyArg-109
116-AsnArgGlnThrArgGlnAlaPhe-123
151-HisArgThrThrHisLys-156
670-2
AMPHI Regions - AMPHI
10-ArgSerCysPheGly-14
16-ValLysAsnAlaSerGlyValSer-23
34-IleThrArgSerAla-38
77-ValGlySerSerAsnAsnIle-83

Antigenic Index - Jameson-Wolf
4-CysArgAsnCysLeuAlaArgSerCys-12
18-AsnAlaSerGlyValSerSerSerArgIleCysProLeuSer-31

33-LysIleThrArgSerAlaThrSerArgAlaAsnProIle-45
65-AsnThrSerProThrIleSerGlySerSerAlaGluValGlySerSerAsnAsnIleThrArgGlySerIleA
laLysProArgAlaIleAla-95
98-CysCysTrpProProGluSerTrpGluGlyLysAla-109
114-AlaSerProThrArgSerLysSerSer-122
128-AlaCysSerAlaPhe-132

Hydrophilic Regions - Hopp-Woods
33-LysIleThrArgSerAlaThrSerArgAlaAsn-43
73-SerSerAlaGluValGlySer-79
87-SerIleAlaLysProArgAlaIleAla-95
116-ProThrArgSerLysSer-121
671
AMPHI Regions - AMPHI
11-PheAsnAlaProAsn-15
72-LysGluAlaAlaLysSerLeu-78
96-ThrProArgIleAla-100
119-ArgLeuPheIleArgTyr-124

Antigenic Index - Jameson-Wolf
9-ThrProPheAsnAlaProAsnThrProProLysMetArgLeuAlaLysProLysProThrAlaGlu-30
45-GlnAlaMetThrAsnArgGluMetAsnAspArgAlaAsnAlaAsnArgArgGlyTrpAsnGluAlaLysAlaA
rgSerAlaLysGluAlaAlaLysSerLeuAlaLysLysLysGluThrThr-85
98-ArgIleAlaAspSerThrMet-104
110-AlaGluThrArgArgSerAlaMet-117
125-LeuThrGlyAspThr-129

Hydrophilic Regions - Hopp-Woods
16-ThrProProLysMetArgLeuAlaLysProLysProThrAla-29
47-MetThrAsnArgGluMetAsnAspArgAlaAsnAlaAsnArgArgGlyTrpAsnGluAlaLysAlaArgSerA
laLysGluAlaAlaLysSerLeuAlaLysLysLysGluThrThr-85
110-AlaGluThrArgArgSerAlaMet-117
672
AMPHI Regions - AMPHI
38-ArgAlaValAspIleAlaArgAlaLysLys-47
50-AlaAlaLeuProProPheValSerValVal-59
67-AlaGlnAsnIleArgArgIleLeuAlaGluValPro-78
91-AlaPheCysArgGlnPheHisArgProTyr-100
105-ArgValGlnThrAlaSerAspIle-112
115-AlaAlaThrArgPheProAsp-121
131-HisProSerGluTyrGlyGlyThr-138
163-ProGluAsnValGlyGluAlaValArgIleThrGlyAlaGluSer-177

Antigenic Index - Jameson-Wolf
1-MetArgLysIleArgThrLysIle-8
13-ThrProGluAspAlaAlaAla-19
35-GlySerSerArgAlaValAspIleAlaArgAlaLysLysIleThr-49
65-GluSerAlaGlnAsnIleArgArgIleLeuAla-75
84-PheHisGlyAspGluAspAspAlaPhe-92
110-SerAspIleArgAsnAlaAlaThrArgPheProAspAla-122
130-TyrHisProSerGluTyrGlyGlyThrGlyAsnArgPheAsp-143
148-AlaGluTyrSerGlyLysPro-154
160-GlyLeuThrProGluAsnValGlyGluAlaValArg-171
176-GluSerValAspValSerGlyGlyValGluAlaSerLysGlyLysLysAspAlaAlaLys-195
202-ThrAlaAsnArgLeuSerArg-208

Hydrophilic Regions - Hopp-Woods
1-MetArgLysIleArgThrLysIle-8
13-ThrProGluAspAlaAlaAla-19
36-SerSerArgAlaValAspIleAlaArgAlaLysLysIleThr-49
66-SerAlaGlnAsnIleArgArgIleLeuAla-75
85-HisGlyAspGluAspAspAlaPhe-92
110-SerAspIleArgAsnAlaAla-116
134-GluTyrGlyGlyThrGlyAsn-140
165-AsnValGlyGluAlaValArg-171
176-GluSerValAspVal-180
184-ValGluAlaSerLysGlyLysLysAspAlaAlaLys-195
204-AsnArgLeuSerArg-208
673
AMPHI Regions - AMPHI
84-LeuAsnAspArgLeuAsnGlnAsnValThrGluAlaLeuGlyGlyValAspVal-101
110-ArgPheThrAspAla-114
117-ValValLeuLysGlnLeuProLys-124
172-ArgIleAlaAsnLeuGluLeuIleLysProTyrLeu-184
212-LysLeuPheArgTyrLeuGlyGluGlu-220
261-GlyGluArgLeuLysLysIleSerThr-269
275-MetGluLysLeuPhe-279
285-LeuLysValTrpValLysValLys-292

Antigenic Index - Jameson-Wolf
7-LeuAlaGlyGluArgAlaAlaGlyGlyTyrArg-17
24-ValGlyArgProAsnValGlyLysSerThr-33
44-SerIleThrSerLysLysAlaGlnThrThrArgAsnArgValThr-58
61-TyrThrAspAspThrAla-66
73-ThrProGlyPheGlnThrAspHisArgAsnAlaLeuAsnAspArgLeuAsnGlnAsnValThrGlu-94
110-ArgPheThrAspAlaAspArgValVal-118
121-GlnLeuProLysHisThr-126
134-LysIleAspLysAspLysAlaLysAspArgTyrAla-145
153-ValArgAlaGluPhe-157
180-IleLysProTyrLeuProGluSerVal-188
190-MetTyrProGluAspMetValThrAspLysSerAlaArg-202
208-IleValArgGluLysLeuPhe-214
217-LeuGlyGluGluLeuPro-222
227-ValGluValGluGlnPheGluGluGluAspGlyLeuAsn-239
247-ValAspLysGluSerGlnLys-253
258-GlyLysGlyGlyGluArgLeuLysLysIleSerThrGluAlaArgLeuAspMetGluLysLeuPheAsp-28
0
291-ValLysSerGlyTrpAlaAspAspIleArgPheLeuArg-303

Hydrophilic Regions - Hopp-Woods
7-LeuAlaGlyGluArgAlaAlaGly-14
45-IleThrSerLysLysAlaGlnThrThrArgAsnArgVal-57
61-TyrThrAspAspThrAla-66
78-ThrAspHisArgAsnAlaLeuAsnAspArgLeuAsn-89
110-ArgPheThrAspAlaAspArgValVal-118
134-LysIleAspLysAspLysAlaLysAspArgTyrAla-145
153-ValArgAlaGluPhe-157
194-AspMetValThrAspLysSerAlaArg-202
208-IleValArgGluLysLeuPhe-214
217-LeuGlyGluGluLeuPro-222

227-ValGluValGluGlnPheGluGluGluAspGlyLeuAsn-239
247-ValAspLysGluSerGlnLys-253
259-LysGlyGlyGluArgLeuLysLysIleSerThrGluAlaArgLeuAspMetGluLysLeuPheAsp-280
293-SerGlyTrpAlaAspAspIleArgPheLeuArg-303
674
AMPHI Regions - AMPHI
16-ValTyrGlnSerLeuIle-21
24-ThrAlaAlaProGluIleAlaLysAsnIleArgGluMetSerAspPheAlaLysAlaAspGluGluLeu-46
58-AlaAlaGluTyrIleArgGlnIleArgPro-67
86-ThrAlaCysHisGluLeuSerAlaMetProGluThr-97
107-IleGluValThrLysThrPheGlyGlyThrAspGlyHisLysPheValAsnGlyIleLeuAspLysLeuAla
-130

Antigenic Index - Jameson-Wolf
1-MetLysThrAlaArgArgArgSerArgGluLeuAla-12
28-GluIleAlaLysAsnIleArgGluMetSerAspPheAlaLysAlaAspGluGluLeuPhe-47
54-ThrGlnThrAsnAla-58
63-ArgGlnIleArgProLeuLeuAspArgAspGluLysAspLeuAsnProIleGluArg-81
93-AlaMetProGluThrProTyr-99
105-GluAlaIleGluValThrLysThrPheGlyGlyThrAspGlyHisLysPhe-121
129-LeuAlaAlaGlnIleArgProAspGluProLysArgArg-141

Hydrophilic Regions - Hopp-Woods
1-MetLysThrAlaArgArgArgSerArgGluLeuAla-12
28-GluIleAlaLysAsnIleArgGluMetSerAspPheAlaLysAlaAspGluGluLeuPhe-47
63-ArgGlnIleArgProLeuLeuAspArgAspGluLysAspLeuAsnProIleGluArg-81
105-GluAlaIleGluVal-109
133-IleArgProAspGluProLysArgArg-141
675
AMPHI Regions - AMPHI
21-ArgPheThrAsnGluIleGlySerGluMetLeuLysValCysCysArgThrLeuGlnGluLeuGly-42
74-AlaLeuIleAlaIle-78
123-GlnAlaIleGluArgIleGluGluLysAlaSerAsp-134
141-GluCysAlaAsnLeuValAsnLeuLeuLeuGlu-151

Antigenic Index - Jameson-Wolf
6-ProAsnLeuAspGlyLysHisLeuArg-14
26-IleGlySerGluMetLeu-31
42-GlyValAlaAspGluAsnIle-48
68-SerSerGluLysPheAsp-73
82-IleArgGlyGluThrTyr-87
92-ValSerAsnGluSerGlyAlaGlyVal-100
118-ThrGluAsnAspAlaGlnAlaIleGluArgIleGluGluLysAlaSerAspAlaAlaLysValAlaVal-14
0
152-GluGlnPheGluAspGluGlu-158

Hydrophilic Regions - Hopp-Woods
8-LeuAspGlyLysHisLeuArg-14
26-IleGlySerGluMetLeu-31
42-GlyValAlaAspGluAsnIle-48
68-SerSerGluLysPheAsp-73
82-IleArgGlyGluThrTyr-87
92-ValSerAsnGluSerGlyAlaGly-99
118-ThrGluAsnAspAlaGlnAlaIleGluArgIleGluGluLysAlaSerAspAlaAlaLysValAlaVal-14
0

152-GluGlnPheGluAspGluGlu-158
677
AMPHI Regions - AMPHI
20-AlaArgPheCysArgPheArgArg-27
45-LeuThrProPheArgArgValGlnAsnHisPheValAlaPheAlaArgPheAsnGln-63
79-IleAspPheIleAspAlaAsp-85
87-PheAspGlyLeuLeuAlaPro-93
105-LysHisLeuValGlyArgPhe-111
155-CysArgProValAspAspLeuAspAspPheGlyAlaPhePheValAspGlnLeuIleLysLeuValPheGln
Cys-179

Antigenic Index - Jameson-Wolf
23-CysArgPheArgArgHisSerArgSerValAsp-33
35-AspValPheAspArgLysAspPheAsn-43
47-ProPheArgArgValGln-52
61-PheAsnGlnThrThrSerGlnArgArgAsnProArgAsnPheVal-75
82-IleAspAlaAspAspPheAspGly-89
97-GlnGlnSerAspArgArgAlaGluLysHisLeu-107
115-GlyIleAspAspAspGlySerLeu-122
125-PheGlyGlnGluThrAspAlaAlaVal-133
156-ArgProValAspAspLeuAspAspPheGly-165
181-ProSerGlyGlyArgAsn-186

Hydrophilic Regions - Hopp-Woods
23-CysArgPheArgArgHisSerArgSerValAsp-33
35-AspValPheAspArgLysAspPhe-42
65-ThrSerGlnArgArgAsnProArg-72
82-IleAspAlaAspAspPheAsp-88
97-GlnGlnSerAspArgArgAlaGluLysHisLeu-107
115-GlyIleAspAspAspGlySer-121
126-GlyGlnGluThrAspAlaAlaVal-133
156-ArgProValAspAspLeuAspAsp-163
678
AMPHI Regions - AMPHI
10-LeuValSerAlaValIle-15
24-MetArgGlyValIle-28
80-IleGlnLysMetLeuArgSerLeuLeuThrSerAla-91
102-ArgIleLeuGlyGlyValPheGlyAlaLeu-111
130-ProAspThrGluGlu-134

Antigenic Index - Jameson-Wolf
125-SerLysThrAspLeuProAspThrGluGluTrpArgGlnSerTyrThr-140
154-HisSerGlyGlyThrAlaGluThrProGluAspAsp-165

Hydrophilic Regions - Hopp-Woods
125-SerLysThrAspLeuProAspThrGluGluTrpArgGln-137
157-GlyThrAlaGluThrProGluAspAsp-165
681-2
AMPHI Regions - AMPHI
12-PheSerGluGluAlaLysPheIleSerAlaMet-22
120-CysLeuArgValGlyArgAlaValArgArg-129

Antigenic Index - Jameson-Wolf
9-AlaSerAsnPheSerGluGluAlaLysPhe-18
39-AlaThrProAsnSerTrpArgValArgGlnGln-49

59-LeuValLysArgAlaCys-64
67-ProMetArgArgCysLeuProSerArgLeu-76
90-GlyPheGlyMetProSerGluGly-97
102-AlaAlaSerArgArgArgPheGlyMetCysArgLeuArgGlnAlaProMetArgCysLeuArgValGlyArg
AlaValArgArgPheGln-131
134-PheTrpArgCysArgArgGly-140

Hydrophilic Regions - Hopp-Woods
11-AsnPheSerGluGluAlaLysPhe-18
44-TrpArgValArgGln-48
59-LeuValLysArgAlaCys-64
67-ProMetArgArgCysLeuPro-73
102-AlaAlaSerArgArgArgPheGly-109
112-ArgLeuArgGlnAlaPro-117
119-ArgCysLeuArgValGlyArgAlaValArgArg-129
682-2
AMPHI Regions - AMPHI
33-ArgLeuArgLysCysGlyArgIleLeuSerGlyIleCysGluProPhe-48
99-CysArgLeuPheCysAspGly-105

Antigenic Index - Jameson-Wolf
9-SerTyrGlyLysTrpArgLysAsnTrpAspIle-19
30-SerSerThrArgLeuArgLysCysGlyArg-39
69-ArgThrLeuArgLeuArgGlySerArgThrArg-79
84-GlyProPheTrpPheCysHisArgProArgGlnSerHisGly-97
102-PheCysAspGlySerMetAspGlnThrArgAspArgArgCysArgSer-117
121-LeuHisSerAspArgTyrArgHisSerAsnLeuTrp-132

Hydrophilic Regions - Hopp-Woods
12-LysTrpArgLysAsnTrpAsp-18
32-ThrArgLeuArgLysCysGlyArg-39
69-ArgThrLeuArgLeuArgGlySerArgThr-78
91-ArgProArgGlnSerHisGly-97
105-GlySerMetAspGlnThrArgAspArgArgCysArgSer-117
122-HisSerAspArgTyrArgHis-128
683
AMPHI Regions - AMPHI
26-ThrProAspLysSerAlaArgTrpGluAsnIleGlyThrIleSerAsn-41
75-ArgPheAlaAsnThrPro-80
101-SerSerLeuGlnLeuPhe-106
124-ArgProMetSerIleLeuSerGly-131

Antigenic Index - Jameson-Wolf
24-CysSerThrProAspLysSerAlaArgTrpGluAsn-35
37-GlyThrIleSerAsnGly-42
48-IleAsnLysAspSerValArgLysAsnGlyAsn-58
63-GlnAspLysLysValValThrAsnLeuLysGlnGluArgPheAlaAsnThrProAlaTyr-82
93-CysAsnAsnLysThrTyrArgLeu-100
106-PheAspThrLysAsnThrGluIleSerThrGlnAsnTyrThrAlaSerSerLeuArgPro-125
131-GlyThrLeuThrGluLysGlnTyrGlu-139
141-ValCysGlyLysLysLeu-146

Hydrophilic Regions - Hopp-Woods
25-SerThrProAspLysSerAlaArgTrpGluAsn-35
48-IleAsnLysAspSerValArgLysAsnGly-57

63-GlnAspLysLysValValThr-69
71-LeuLysGlnGluArgPheAla-77
107-AspThrLysAsnThrGluIleSer-114
133-LeuThrGluLysGlnTyrGlu-139
141-ValCysGlyLysLysLeu-146
684
AMPHI Regions - AMPHI
13-AlaAlaCysGlyThrValGln-19
47-LeuAlaGluProLeu-51
73-TrpAlaAspThrLeuAspAspMetLeuGluAlaAlaLeuSerAsnAlaPheAsnArgLeuAspSerThr-95
110-TrpThrValTyrIleAspAlaPheGlnGlySerTyr-121
154-AlaMetThrAlaAlaLeuGluGlnGlyLeuLysGlnAlaAlaGlnGlnMetVal-171

Antigenic Index - Jameson-Wolf
26-LeuProAspSerArgTyrIleArgProAlaThrGlnGlyGlyGluThrAlaValGluValArgLeuAlaGluP
roLeuLysArgGlyGlyLeu-56

60-ThrAspProTyrArgLeuAsnThrAlaGln-69
76-ThrLeuAspAspMetLeuGlu-82
90-AsnArgLeuAspSerThrArg-96
101-AlaSerArgSerGlySerThrGluLys-109
117-PheGlnGlySerTyrThrGlyLysThrLeu-126
133-LeuProAspGlyThrAsnArgProPheHisIleGluThrGluGlnGlnGlyAspGlyTyrAla-153
161-GlnGlyLeuLysGlnAlaAla-167

Hydrophilic Regions - Hopp-Woods
27-ProAspSerArgTyrIleArg-33
35-AlaThrGlnGlyGlyGluThrAlaValGluValArgLeuAlaGluProLeuLysArgGlyGly-55
76-ThrLeuAspAspMetLeuGlu-82
90-AsnArgLeuAspSer-94
102-SerArgSerGlySerThrGluLys-109
141-PheHisIleGluThrGluGlnGlnGlyAsp-150
161-GlnGlyLeuLysGlnAlaAla-167
685
AMPHI Regions - AMPHI
7-AsnPheAlaPheCysGlyValVal-14
44-CysAlaValLeuLeu-48
94-TrpAlaAlaLeuAspThrLeuThrGluLeu-103
137-TyrGluAlaLeuHisArgTyr-143
154-GlyAlaGluAlaTyrGluGlnLeuAlaLysAsn-164
182-GluLysGlnMetGluThrLeuAlaArgIlePheGlyLysGlu-195
206-AspAlaLeuPheAla-210
296-AlaValGluValLeuAspAsnAlaLeuVal-305
336-AlaAlaGluGlnLeuLysAlaAla-343

Antigenic Index - Jameson-Wolf
20-LeuAsnAsnLysHisSerTyrSerTyrAlaLysGluProHisThrValLysProArgPhe-39
52-SerProGluProAlaAlaGluLysThrValSer-62
74-ProThrAlaArgGlyAspAlaValValProLysAsnProGluArgValAla-90
122-AlaPheAspLysAlaAla-127
133-PheGluProAspTyrGluAlaLeuHisArgTyrAsn-144
151-GlyGlyProGlyAlaGluAlaTyrGluGlnLeuAlaLysAsnAlaThr-166
170-LeuThrValAspAsnGlyAsnIleArgThrSerGlyGluLysGlnMetGluThrLeu-188
192-PheGlyLysGluAlaArgAlaAlaGluLeuLysAlaGlnIle-205
211-GlnThrArgGluAlaAlaLysGlyLysGlyArgGlyLeu-223

227-ValThrGlyAsnLysValSerAlaPheGlyThrGlnSerArgLeu-241
247-GlyAspIleGlyLeuProProValAspGluSerLeuArgAsnGluGlyHisGlyGln-265
271-TyrIleLysGluLysAsnProAspTrpIle-280
285-ArgThrAlaAlaIleGlyGlnGluGlyProAla-295
307-GlyThrAsnAlaTrpLysArgLysGln-315
338-GluGlnLeuLysAlaAlaPheLysLysAlaGluPro-349
351-AlaAlaGlyLysLys-355

Hydrophilic Regions - Hopp-Woods
28-TyrAlaLysGluProHisThrValLys-36
52-SerProGluProAlaAlaGluLysThrValSer-62
75-ThrAlaArgGlyAspAlaValVal-82
84-LysAsnProGluArgValAla-90
122-AlaPheAspLysAlaAla-127
135-ProAspTyrGluAla-139
156-GluAlaTyrGluGlnLeuAlaLys-163
175-GlyAsnIleArgThrSerGlyGluLysGlnMetGluThrLeu-188
192-PheGlyLysGluAlaArgAlaAlaGluLeuLysAlaGlnIle-205
211-GlnThrArgGluAlaAlaLysGlyLysGlyArgGly-222
253-ProValAspGluSerLeuArgAsnGluGlyHisGly-264
271-TyrIleLysGluLysAsnPro-277
290-GlyGlnGluGlyProAla-295
309-AsnAlaTrpLysArgLysGln-315
338-GluGlnLeuLysAlaAlaPheLysLysAlaGluPro-349
351-AlaAlaGlyLysLys-355
686-2
AMPHI Regions - AMPHI
7-ValLeuGlyGlyIleAlaAlaLeu-14
39-GlySerLeuIleGluArgIleAsnAsn-47
146-SerAsnIleLysSerIleAlaAspIleLysGlyValLysThrAlaGlnSerLeuThrSerAsnTyr-167
179-ValAlaValAspGlyLeuAlaGlnSerLeu-188
204-LeuAlaValLeuAspTyrLeuLysLysAsnPro-214
241-AspGluAlaValAlaLysPheSerThrAlaIle-251
255-LysAlaAspGlyThrLeuLysLysLeuGlyGluGlnPhe-267

Antigenic Index - Jameson-Wolf
20-GlyGlySerGluGlyGlySerGlyAlaSerSerAlaProAlaGlnSerAlaVal-37
40-SerLeuIleGluArgIleAsnAsnLysGlyThrVal-51
54-GlyThrGluGlyThr-58
64-TyrHisAspLysAspGlyLysLeuThrGlyTyrAspValGluValThrArgAlaValAlaGluLysLeuGlyV
al-88
90-ValGluPheLysGluThrGlnTrp-97
118-LeuThrSerProGluArgGlnAlaThrPheAspLysSerAspProTyrSerTrp-135
143-ArgAsnAspSerAsnIleLysSerIleAlaAspIleLysGlyValLysThrAlaGln-161
163-LeuThrSerAsnTyrGlyGluLysAlaLysAlaAlaGly-175
191-IleGluGlnLysArgAlaAspAlaThrLeuAsnAspGluLeuAla-205
209-TyrLeuLysLysAsnProAsnAlaGly-217
225-ProAlaAspGluLysValGlySer-232
235-IleValAsnLysGlyAsnAspGluAlaValAla-245
252-AsnGluLeuLysAlaAspGlyThrLeuLysLysLeuGly-264
267-PhePheGlyLysAspIleSerValGln-275

Hydrophilic Regions - Hopp-Woods
20-GlyGlySerGluGlyGlySerGly-27
41-LeuIleGluArgIleAsnAsn-47

64-TyrHisAspLysAspGlyLysLeuThrGlyTyrAspValGluValThrArgAlaValAlaGluLysLeuGlyV
al-88
90-ValGluPheLysGluThrGlnTrp-97
120-SerProGluArgGlnAlaThrPheAspLysSerAspPro-132
143-ArgAsnAspSerAsnIle-148
150-SerIleAlaAspIleLysGlyValLysThr-159
167-TyrGlyGluLysAlaLysAlaAlaGly-175
191-IleGluGlnLysArgAlaAspAlaThrLeuAsnAspGluLeuAla-205
209-TyrLeuLysLysAsnProAsnAla-216
225-ProAlaAspGluLysValGly-231
238-LysGlyAsnAspGluAlaValAla-245
252-AsnGluLeuLysAlaAspGlyThrLeuLysLysLeuGly-264
687
AMPHI Regions - AMPHI
11-AlaAlaLeuPheAlaLeu-16
64-LysValGluValLeuGluPhePheGlyTyrPheCysPro-76
78-CysAlaHisLeuGluProValLeuSerLysHisAlaLysSerPhe-92
112-LeuAlaArgLeuAlaAlaAla-118
148-ProGluValLeuLysLysTrpLeu-155
176-GlnAlaArgAlaAspLysMetGlnGluLeuThrGluThrPhe-189

Antigenic Index - Jameson-Wolf
1-MetLysSerArgHis-5
19-CysAspSerLysValGlnThrSerValProAlaAspSerAlaPro-33
43-GlyLeuValGluGlyGlnAsnTyr-50
56-ProIleProGlnGlnGlnAlaGlyLysValGluVal-67
87-LysHisAlaLysSerPheLysAspAspMetTyrLeu-98
122-AlaAlaAlaAspSerLysAspValAlaAsn-131
141-GlnLysIleLysLeuGlnAsnProGluValLeuLys-152
159-ThrAlaPheAspGlyLysLysVal-166
171-GluSerProGluSerGlnAlaArgAlaAspLysMetGlnGluLeuThrGlu-187
189-PheGlnIleAspGlyThrPro-195
199-ValGlyGlyLysTyrLysValGluPheAlaAsp-209
211-GluSerGlyMetAsnThr-216
220-LeuAlaAspLysValArgGluGluGlnLysAlaAlaGln-232

Hydrophilic Regions - Hopp-Woods
1-MetLysSerArgHis-5
19-CysAspSerLysValGlnThr-25
27-ValProAlaAspSerAlaPro-33
61-GlnAlaGlyLysValGluVal-67
87-LysHisAlaLysSerPheLysAspAspMetTyrLeu-98
122-AlaAlaAlaAspSerLysAspValAla-130
141-GlnLysIleLysLeuGlnAsn-147
159-ThrAlaPheAspGlyLysLysVal-166
171-GluSerProGluSerGlnAlaArgAlaAspLysMetGlnGluLeuThrGlu-187
201-GlyLysTyrLysValGluPheAlaAsp-209
220-LeuAlaAspLysValArgGluGluGlnLysAlaAlaGln-232
688
AMPHI Regions - AMPHI
23-LeuSerAlaLeuLeuGlyLeu-29
121-AspValLeuGlnAsnAlaAlaGluAlaLeuLysAsp-132

Antigenic Index - Jameson-Wolf
4-TyrProSerArgPheAlaGln-10

13-IleSerValAsnLys-17
33-SerAlaGluArgValSer-38
47-IleIleGlnGlyAsnGluLeuGluProArgAla-57
62-ArgProGlyMetThrLysAspGln-69
82-AlaPheHisThrAspArgTrpAspTyr-90
92-PheAsnThrSerArgAsnGlyIleIleLysGluArgSerAsnLeu-106
116-ValArgThrGluGlyAspVal-122
126-AlaAlaGluAlaLeuLysAspArgGlnAsnThrAspLysPro-139

Hydrophilic Regions - Hopp-Woods
33-SerAlaGluArgValSer-38
51-AsnGluLeuGluProArgAla-57
64-GlyMetThrLysAspGln-69
98-GlyIleIleLysGluArgSerAsn-105
116-ValArgThrGluGlyAspVal-122
126-AlaAlaGluAlaLeuLysAspArgGlnAsnThrAspLysPro-139
689
AMPHI Regions - AMPHI
55-TyrProGluMetSerGluLysLeuMet-63
65-ValLeuMetAlaMetLeuValThrLeu-73
82-LeuProAlaIleProGluMetAlaGln-90
111-AlaPheGlyGlnValValGlyGly-118
123-IleLysGlyArgLys-127
154-LeuAsnLeuArgValValGlnAlaPheGlyAlaGly-165
188-PheAlaLeuIleGlyIleIleLeu-195
203-ProMetValGlyAlaLeuLeuGlnGlyLeuGlyGlyTrpGlnAlaIlePheVal-220
230-LeuGlyLeuValGlnTyrPhe-236
245-LysIleGlyArgAspVal-250
257-ArgPheLysArgValLeu-262
277-SerPheGlySerMetPheAla-283
293-GlnGlnLeuTyrArgVal-298
344-AlaAlaAsnLeuSerGlnLeuAlaAlaValLeuPhe-355
400-ValLeuGlyValPheGlnSerLeuIleGly-409

Antigenic Index - Jameson-Wolf
36-PheArgArgArgAlaVal-41
45-IleGlyArgGluPheMetProSer-52
57-GluMetSerGluLysLeu-62
95-AspValHisArgIleGluGln-101
119-SerValSerAspIleLysGlyArgLysProVal-129
174-MetValArgAspTyrTyrSerGlyArgLysAlaAla-185
238-ProLysProAlaValGlyGlyLysIleGlyArgAspValPhe-251
257-ArgPheLysArgValLeuLysThrArgAla-266
325-LeuLysThrGlyValHis-330
390-PheLysGluGluGlyGlySer-396
448-ArgAlaTrpLysGluAsnGlyGlnSerGluTyrLeu-459

Hydrophilic Regions - Hopp-Woods
36-PheArgArgArgAlaVal-41
45-IleGlyArgGluPheMet-50
57-GluMetSerGluLysLeu-62
95-AspValHisArgIleGluGln-101
119-SerValSerAspIleLysGlyArgLysProVal-129
178-TyrTyrSerGlyArgLysAlaAla-185
245-LysIleGlyArgAspVal-250

257-ArgPheLysArgValLeuLysThrArgAla-266
390-PheLysGluGluGlyGlySer-396
448-ArgAlaTrpLysGluAsnGlyGln-455
690
AMPHI Regions - AMPHI
38-SerSerAlaSerSerAla-43
54-SerAlaProAspAsnValLysGlnAla-62
68-SerAsnCysThrSerLeuHisProAlaThrGlyIleAspAspLeuMetGlnGlnIleAlaGluHisIle-90
113-GlyTyrAspAsnIleGlnArgLeu-120
148-ArgThrIleSerArgGlnAlaGlnAsnAla-157
186-ProLysArgThrArgTyrPhe-192
210-GlyAsnPheGlnTyrIleSerGlnLeuProGlyTyrLeuLys-223

Antigenic Index - Jameson-Wolf
1-MetLysAsnLysThrSer-6
20-CysSerProSerLysAspAspLysThrLysGluValGlyAla-33
37-SerSerSerAlaSerSerAlaProSerGlnThrAspLeuGlnProThrAlaSerAlaProAspAsnValLysG
lnAlaGluSerAlaProProSerAsnCys-70
76-AlaThrGlyIleAspAspLeuMet-83
88-GluHisIleAspSerAspCys-94
101-HisGluLeuGluThrArgPheGlyLeuProAspGlyGlyTyrAspAsnIleGln-118
123-ProAspIleArgProGluAspProAspTyrHisGln-134
141-GluAspLeuArgTyrGlyLysArgThrIleSerArgGlnAlaGln-155
159-MetGluGlnGluArgArgLeuArgGlu-167
175-GlySerGlnGluThrArgGlyGlnGlyGluGluProLysArgThrArgTyr-191
196-AlaThrProAlaTyrSerSerArgHisAsnAsnGlyLeuGlyGly-210
225-HisGlyGluMetLeuGluAsnGlnSerLeu-234
236-ArgLeuSerAsnArgGluArgAsnProAspLysProPheLeu-249
252-HisPheAspGluAsnGlyLysIleThr-260
264-ValTyrGluLysAsnIle-269
272-AsnProAsnThrGlyArgIle-278

Hydrophilic Regions - Hopp-Woods
1-MetLysAsnLysThr-5
21-SerProSerLysAspAspLysThrLysGluValGlyAla-33
39-SerAlaSerSerAlaProSerGlnThrAspLeuGlnPro-51
54-SerAlaProAspAsnValLysGlnAlaGluSerAlaPro-66
78-GlyIleAspAspLeuMet-83
88-GluHisIleAspSer-92
101-HisGluLeuGluThr-105
125-IleArgProGluAspProAspTyrHis-133
141-GluAspLeuArgTyrGlyLysArgThrIleSerArgGlnAlaGln-155
159-MetGluGlnGluArgArgLeuArgGlu-167
175-GlySerGlnGluThrArgGlyGlnGlyGluGluProLysArgThrArgTyr-191
200-TyrSerSerArgHisAsnAsn-206
225-HisGlyGluMetLeuGlu-230
237-LeuSerAsnArgGluArgAsnProAspLysProPhe-248
252-HisPheAspGluAsnGlyLysIleThr-260
274-AsnThrGlyArgIle-278
691
AMPHI Regions - AMPHI
11-LysProAlaAlaSer-15
55-HisAsnGluLeuArgLysIleArgThrAla-64
108-ArgTyrLeuSerGly-112

Antigenic Index - Jameson-Wolf
7-CysArgPheAlaLys-11
35-ProProAsnAspPheGlnProAsnCysAspIleArgArgLeuGlyLeuThrGlnSerGlnHisAsnGluLeuA
rgLysIleArgThr-63
67-MetAlaGlyAspArgAlaArgLeuLysValMetHis-78
80-GluHisSerArgArgArgSerVal-87
91-IleSerSerAspValPheAsnArgAsnGluAlaArgAspTyrValGluSerArgTyrLeuSerGlyMetAspP
heAlaValAspGluLeuGluIle-122
131-ThrProGlnGlnGlnGln-136
140-SerSerCysLeuLys-144

Hydrophilic Regions - Hopp-Woods
43-CysAspIleArgArgLeuGly-49
54-GlnHisAsnGluLeuArgLysIleArgThr-63
67-MetAlaGlyAspArgAlaArgLeuLysValMetHis-78
80-GluHisSerArgArgArgSerVal-87
95-ValPheAsnArgAsnGluAlaArgAspTyrValGlu-106
115-PheAlaValAspGluLeuGluIle-122
692
AMPHI Regions - AMPHI
6-CysArgCysSerGluSerIleArgArgIleArgArgAsn-18
77-LeuGlyTyrValPheLysProLeuAlaValPheVal-88
106-GlnGlyPheGlyGlnLeuHis-112
132-ThrArgGlnLeuArgGlyPheLys-139
143-PheAspValPheGlnValLeuGly-150
170-GlnPheValGluHisHis-175
177-AspAlaGlyGluValGlyArgValValGlyArgGlyTyrGlyAlaAlaValPheAspPhePheGlnArgPhe
GlnLeu-202
205-ValGlnSerGlnArgArgGlyArgHisLeuGluAspPheGlyAsp-219
253-IleValGlyLysLeuAspGlnPheAspGlyVal-263
275-PheAspHisIleAlaGluValAlaAsp-283

Antigenic Index - Jameson-Wolf
6-CysArgCysSerGluSerIleArgArgIleArgArgAsnGlyArgGluTrpArgIleLysGlyGlnLysCysAr
gLeuAsnThrAspThrValGln-37
89-GlyGlyPheAspGlyArgProValAspIleGlyLysAlaArgPheLeu-104
120-AlaValAspAspGlyLysIle-126
131-AlaThrArgGlnLeuArgGlyPheLysLeuAspAspPheAsp-144
150-GlyAspValArgPheGlyCysGlyGlnArgIleAspAla-162
174-HisHisGlnAspAlaGlyGluValGlyArgValValGlyArgGlyTyr-189
204-ArgValGlnSerGlnArgArgGlyArgHisLeuGluAspPheGlyAsp-219
236-GluAspValAspVal-240
255-GlyLysLeuAspGlnPheAspGly-262
279-AlaGluValAlaAspGlyArgAlaGluAspAspPhePhePhe-292
295-AlaValValGlyGlyGlyArgSerGlyCysGlyGlyArg-307
313-AlaAlaGlyGlyGluAspGluArgGluCysGlyGlyGlyLysGlyPheGluGlu-330

Hydrophilic Regions - Hopp-Woods
7-ArgCysSerGluSerIleArgArgIleArgArgAsnGlyArgGluTrpArgIleLysGlyGlnLysCysArgLe
uAsnThr-33
91-PheAspGlyArgProValAspIleGlyLys-100
120-AlaValAspAspGlyLysIle-126
131-AlaThrArgGlnLeuArgGlyPheLysLeuAspAspPheAsp-144
174-HisHisGlnAspAlaGlyGluValGlyArgValValGly-186
206-GlnSerGlnArgArgGlyArgHisLeuGluAspPheGlyAsp-219

236-GluAspValAspVal-240
256-LysLeuAspGlnPheAsp-261
279-AlaGluValAlaAspGlyArgAlaGluAspAspPhePhePhe-292
299-GlyGlyArgSerGlyCysGlyGly-306
315-GlyGlyGluAspGluArgGluCysGlyGly-324
326-LysGlyPheGluGlu-330
694
AMPHI Regions - AMPHI
82-ArgGlyArgAlaCysArg-87
116-CysArgHisPheAlaGln-121
123-ValAlaValGlyArgIleGly-129
140-PheCysGlnLeuPheAsp-145
156-AspIlePheLeuVal-160
162-IleAlaAspIleGlyGlu-167
184-ArgGlyLeuAlaAspIleGlyGluPheValGlyValSerAsp-197
251-HisGlnArgAlaSerArgIleLys-258
283-ArgAlaArgArgHisPheArgGlnValPheAsn-293
311-AspPheValAlaHisIle-316
340-AlaAlaArgIleGly-344

Antigenic Index - Jameson-Wolf
3-SerAlaSerGlyThrArgGlnLysCysArgLeuLysProVal-16
23-ProLysHisSerThrProAlaSer-30
47-GlyGlnAspGluHisAsnAla-53
66-ProProSerAlaTyrGly-71
79-HisPheGlyArgGlyArgAlaCysArgTyr-88
110-ArgIleAspSerAlaArgCysArgHis-118
127-ArgIleGlyArgThrAspHisAsnHisAsp-136
144-PheAspGlyGlyLeuProValGlyArgArgIleAla-155
163-AlaAspIleGlyGluThrArgValGlnArgGlyAspAspValPhe-177
180-IleAspArgGluArgGlyLeuAlaAsp-188
202-HisIleSerAspArgPheAspGlnLysHisPheAlaArgArgLysLeuProHisArgSerPheAspLeu-22
4
228-LeuMetProAspHisAspAspPheThr-236
250-ArgHisGlnArgAlaSerArgIleLysHisAlaGluThrAlaLeu-264
268-LeuProHisArgLeuArgTyrAla-275
280-AsnGlnCysArgAlaArgArgHisPhe-288
291-ValPheAsnLysHisArgThr-297
316-IleAsnArgArgAlaGluLeu-322
326-ThrPheAspAsnThrAspCysPro-333
336-ThrSerAlaGluAlaAlaArgIleGlyLysAspAspGlyPhe-349
370-TyrGlyGlyArgCysCysProThrPrcProThrProHisArgArgArg-385

Hydrophilic Regions - Hopp-Woods
5-SerGlyThrArgGlnLysCysArgLeuLysPro-15
47-GlyGlnAspGluHisAsnAla-53
81-GlyArgGlyArgAlaCysArg-87
110-ArgIleAspSerAlaArgCysArgHis-118
127-ArgIleGlyArgThrAspHisAsnHis-135
150-ValGlyArgArgIleAla-155
163-AlaAspIleGlyGluThrArgValGlnArgGlyAspAsp-175
180-IleAspArgGluArgGlyLeuAlaAsp-188
202-HisIleSerAspArgPheAspGlnLysHisPheAlaArgArgLysLeuProHisArgSerPheAspLeu-22
4
230-ProAspHisAspAsp-234

250-ArgHisGlnArgAlaSerArgIleLysHisAlaGluThrAlaLeu-264
280-AsnGlnCysArgAlaArgArgHisPhe-288
292-PheAsnLysHisArg-296
316-IleAsnArgArgAlaGluLeu-322
327-PheAspAsnThrAsp-331
338-AlaGluAlaAlaArgIleGlyLysAspAspGly-348
380-ThrProHisArgArgArg-385
695
AMPHI Regions - AMPHI
36-HisProGlnArgPheGlnSerLysProAlaGluArgProAlaHisArgPro-52
129-ValArgLeuSerAsnGluValGlu-136
144-AlaLeuGluHisAlaLysThrHisSer-152
156-AlaTyrValGlnLysLeuAsp-162
183-ValGluThrAlaGlnAsnLeuTyrAsnGlnAlaLeuLysHisTyrLysSerGly-200
205-AlaAlaSerLeuLeuLysGlyAla-212
238-CysGluSerValIleGluIle-244
248-TyrAlaAsnArgPheLysAspSer-255
278-AlaArgAlaThrTrpArgSerLeuIleGlnThrTyrProGly-291

Antigenic Index - Jameson-Wolf
1-LeuProGlnThrArgProSerArgArgHisHisArgHisArgGlnTyrPheAlaGluArgLysGlyAspAlaArgSerGlyPhe-28
31-AlaAlaGlnArgArgHisProGlnArgPheGlnSerLysProAlaGluArgProAlaHisArgProHisHisProAlaArgArgArgArgLeuAspProAlaSerGluLysIleMetLys-70
83-SerAlaSerCysAlaSer-88
93-ProAlaGlySerGlnThrGluMetSerThrArgGluAsnAlaSerAspGlyIleProTyr-112
117-LeuGlnAspArgLeuAspTyrLeuGlu-125
127-LysIleValArgLeuSerAsnGluValGluThrLeuAsnGlyLysValLysAlaLeuGluHisAlaLysThrHisSerSerGlyArgAlaTyrValGlnLysLeuAspAspArgLysLeuLysGlu-168
170-TyrLeuAsnThrGluGlyGlySerAla-178
193-AlaLeuLysHisTyrLysSerGlyLysPhe-202
209-LeuLysGlyAlaAspGlyGlyAspGlyGlySerIleAlaGln-222
230-GlnSerArgAlaArgMetGlyAsnCys-238
244-IleGlyGlyArgTyrAlaAsnArgPheLysAspSerProThrAlaPro-259
266-GlyGluCysGlnTyr-270
272-LeuGlnGlnLysAspIleAla-278
289-TyrProGlySerProAlaAlaLysArgAlaAlaAlaAlaValArgLysArg-305

Hydrophilic Regions - Hopp-Woods
2-ProGlnThrArgProSerArgArgHisHisArgHisArgGlnTyrPheAlaGluArgLysGlyAspAlaArgSerGlyPhe-28
31-AlaAlaGlnArgArgHisProGlnArgPheGlnSerLysProAlaGluArgProAlaHisArgProHisHisProAlaArgArgArgArgLeuAspProAlaSerGluLysIleMetLys-70
96-SerGlnThrGluMetSerThrArgGluAsnAlaSerAsp-108
117-LeuGlnAspArgLeuAspTyrLeuGlu-125
127-LysIleValArgLeuSerAsnGluValGluThrLeuAsnGlyLysValLysAlaLeuGluHisAlaLysThrHisSerSerGly-154
157-TyrValGlnLysLeuAspAspArgLysLeuLysGlu-168
195-LysHisTyrLysSerGlyLysPhe-202
210-LysGlyAlaAspGlyGlyAspGlyGlySerIleAlaGln-222
231-SerArgAlaArgMetGlyAsn-237
248-TyrAlaAsnArgPheLysAspSerProThrAlaPro-259
266-GlyGluCysGlnTyr-270
272-LeuGlnGlnLysAspIleAla-278
293-ProAlaAlaLysArgAlaAlaAlaAlaValArgLysArg-305

696
AMPHI Regions - AMPHI
18-PheGlyGlyIlePheHisPheValCysArgPheLeuSerArgValGlySerPheValGlnSerIlePheSerC
ysPheSer-44
65-IlePheAspLeuValPhe-70
94-GlyLeuAsnArgPheLeuAsnLeuLeuPheGlyPheLeuArg-107

Antigenic Index - Jameson-Wolf
12-CysGlnGlyAsnLysLeu-17
73-PheAspGlyArgSerGlyArgLeuGlyGlyArgSerArgSer-86
108-ThrSerCysGlnGlySerArgHisHisCysGlyAsnGln-120

Hydrophilic Regions - Hopp-Woods
73-PheAspGlyArgSerGlyArgLeuGlyGlyArgSerArgSer-86
109-SerCysGlnGlySerArgHisHisCys-117

700
AMPHI Regions - AMPHI
6-ThrLeuLeuSerValLeuIleProMetPheAlaGlyPhePheIleArgValProLys-24
27-LeuProAlaLeuAspLysValLeuSerValLeu-37
51-ArgValGluAspLeuGlySerArg-58
80-AlaLeuAlaValLeuGlyLysLeu-87
119-PheGlyLysLeuMetArgAsp-125
191-SerTrpThrLysGlyLeu-196
204-TrpTyrSerLeuSerGlyLeuVal-211
216-TyrGlyAlaValTrp-220
228-AspLeuAlaArgGluLeu-233
268-GlyAlaGlyGlyLeu-272

Antigenic Index - Jameson-Wolf
21-ArgValProLysProTyrLeu-27
50-SerArgValGluAspLeuGlySerArgLeuAspAspMetAla-63
90-TrpArgIleLysGlyLysGlyLysGlyVal-99
128MetProSerGluSerAlaGlyMetTyr-136
149-LeuLysSerSerGlyValSerLeu-156
160-LeuValAsnArgArgGlyIleArgLeu-168
185-AlaSerThrAspGlyValSer-191
245-ArgPheProAspAla-249
268-GlyAlaGlyGlyLeu-272

Hydrophilic Regions - Hopp-Woods
50-SerArgValGluAspLeuGlySerArgLeuAspAspMetAla-63
92-IleLysGlyLysGlyLysGlyVal-99
149-LeuLysSerSerGlyValSer-155
160-LeuValAsnArgArgGlyIleArg-167
701
AMPHI Regions - AMPHI
6-PheHisValAlaGly-10
30-CysLeuAspThrSer-34
45-ProAsnSerPheAlaSerPheLysArgPheSerSerIle-57
79-GlyProAlaProAlaMet-84

Antigenic Index - Jameson-Wolf
17-AlaGlnSerThrProSerSerProThrMet-26
29-ThrCysLeuAspThrSerProGluAlaGly-38

52-LysArgPheSerSerIleSer-58
72-AsnArgAlaAspIleProThrGlyProAla-81
104-GlyLysAlaSerLeuAsnAsnArgAla-112
119-SerGlySerGlyThrArgLeu-125

Hydrophilic Regions - Hopp-Woods
72-AsnArgAlaAspIleProThr-78
702
AMPHI Regions - AMPHI
51-CysSerGlyLeuValThrVal-57
118-LysIleSerArgGly-122

Antigenic Index - Jameson-Wolf
1-MetProCysSerLysAlaSer-7
28-LeuAlaArgAspSerCysSerProGlyLeu-37
41-ThrAlaProAlaSerSer-46
68-LeuAlaIleArgArgMetAlaSerArgProThrGlyValArgArgValIleSer-85
88-GlyMetProProSerThrArgAlaTrpAspLysSerMetAla-101
118-LysIleSerArgGlyValSer-124
139-ArgTrpAspArgLeu-143

Hydrophilic Regions - Hopp-Woods
29-AlaArgAspSerCysSer-34
69-AlaIleArgArgMetAlaSerArgProThrGlyValArgArgValIleSer-85
94-ArgAlaTrpAspLys-98
139-ArgTrpAspArgLeu-143
703
AMPHI Regions - AMPHI
21-GlnThrLeuAlaThrValAsnGly-28
64-GluValValAsnThrValValAlaGlnGlu-73
79-LeuAspArgSerAlaGlu-84
140-AlaAlaTyrAspAsnIleSerGlyPheTyrLysGly-151
181-PheAspAlaValLeu-185
204-ValProLeuLysAspLeuGluGlnGlyValProProLeuTyrGlnAlaIleLysAspLeuLysLys-225
252-ValProSerPheAsp-256
270-ArgIleAspArgAlaValGlyAlaLeu-278

Antigenic Index - Jameson-Wolf
1-MetLysAlaLysIle-5
26-ValAsnGlyGlnLysIleAspSerSerVal-35
43-PheArgAlaGluAsnSerArgAlaGluAspThrProGlnLeuArg-57
72-GlnGluValLysArgLeuLysLeuAspArgSerAlaGluPheLysAsnAlaLeuAlaLysLeuArgAlaGluA
laLysLysSerGlyAspAspLysLysProSerPheLysThr-109
129-LysThrGlnProValSerGluGlnGluValLysAlaAlaTyr-142
144-AsnIleSerGlyPheTyrLysGlyThrGlnGluValGlnLeu-157
160-IleLeuThrAspLysGluGluAsnAlaLysLysAlaValAlaAspLeuLysAlaLysLysGlyPhe-181
188-TyrSerLeuAsnAspArgThrLysGlnThrGlyAlaProValGly-202
207-LysAspLeuGluGlnGlyValProPro-215
221-LysAspLeuLysLysGlyGluPheThrAlaThrProLeuLysAsnGlyAspPhe-238
243-TyrValAsnAspSerArgGluValLysValProSerPheAspGluMetLysGly-260
266-LeuGlnAlaGluArgIleAspArgAlaVal-275
282-AlaAsnIleLysProAlaLys-288

Hydrophilic Regions - Hopp-Woods
1-MetLysAlaLysIle-5

29-GlnLysIleAspSerSerVal-35
43-PheArgAlaGluAsnSerArgAlaGluAspThrProGlnLeuArg-57
72-GlnGluValLysArgLeuLysLeuAspArgSerAlaGluPheLysAsnAlaLeuAlaLysLeuArgAlaGluA
laLysLysSerGlyAspAspLysLysProSerPhe-107
131-GlnProValSerGluGlnGluValLysAlaAlaTyr-142
160-IleLeuThrAspLysGluGluAsnAlaLysLysAlaValAlaAspLeuLysAlaLysLysGlyPhe-181
189-SerLeuAsnAspArgThrLysGlnThrGly-198
207-LysAspLeuGluGln-211
221-LysAspLeuLysLysGlyGluPhe-228
245-AsnAspSerArgGluValLysValProSerPheAspGluMetLysGly-260
266-LeuGlnAlaGluArgIleAspArgAlaVal-275
282-AlaAsnIleLysProAlaLys-288
704
AMPHI Regions - AMPHI
33-GlyCysGlnAlaValAlaGlnSerIleIleAspAlaGlyLeuGly-47
65-GlnGluIleLeuAspGlnIleArgLeuTyrAspLeuProGluValGlnSerAspPheValGluThrHis-87
184-LeuGlyMetMetGln-188
208-LeuGlnIleLeuHisTrpGlyGlyPheLeuMetValLeuPro-221
232-GlnGlyAlaLeuArgAspLeuLys-239
252-AlaIleIleMetThrPheIleAlaGlyValTyrSer-263
289-PheMetGluHisIleAlaArg-295
298-AlaGlyAspAlaAlaGluArgLeuValLysLeuIleProAlaPheCysHisHisMetProAspTyrProAsp
ThrGlnGluThr-325
400-GlyGlyThrArgLeuSerHisIleValArgLeuLeuAspArgAlaLeuAla-416
423-GluLeuAlaGluGlnTyr-428
499-AlaIleGluThrLeuAlaGln-505
527-IleSerLeuLeuArg-531
576-LeuAsnArgIleGlyGluGlyValGly-584
639-LeuLysAspSerAlaAlaGluAlaValArgGlnLeuAla-651
670-GluThrAlaArgAlaLeuGlyVal-677
691-GluTyrValLysAlaLeuGlnLysGlu-699
744-AspLeuArgThrValAlaHisLeuLeuAsp-753
780-AlaValLeuGlyTyrValGlnProTrpIleAlaAla-791
799-LeuAlaValLeuGly-803
805-AlaLeuArgLeuHisLysArg-811

Antigenic Index - Jameson-Wolf
1-MetLysLysThrCys-5
8-CysGlyLeuAspValProGlu-14
21-ArgTyrGluAsnGluAspArgGluThrCysCys-31
46-LeuGlySerTyrTyrLysGlnArgThrAlaAspAlaGlnLysThrGluLeuProProGlnGluIleLeuAsp-
69
77-ProGluValGlnSerAspPheValGluThrHisGlyGlyThrArgGluAla-93
112-GlnLeuLeuArgThrAspGlyIleVal-120
124-LeuAsnTyrSerThrHisArgCys-131
133-ValValTrpAspAspGlyLysIleArgLeu-142
158-ProTyrAspAlaGlnLysIleGluAlaAlaAsnGlnLysGluArgLysGlnTyr-175
199-TyrGlyGlyAspIleGluProAspPhe-207
234-AlaLeuArgAspLeuLysAsnArgArgValGlyMetAspThrProIle-249
293-IleAlaArgArgLysAlaGlyAspAlaAlaGluArgLeuVal-306
316-MetProAspTyrProAspThrGlnGluThrCysGlu-327
329-AlaValValLysLeuLysAlaGlyAsp-337
342-LysProGlyGluThrIleProValAspGlyThrVal-353
356-GlySerSerAlaValAsnGluSerMetLeuThrGlyGluSer-369
374-LysMetProSerGluLysValThrAla-382

393-IleArgThrAspArgThrGlyGlyGlyThrArg-403
414-AlaLeuAlaGlnLysProArgThrAlaGluLeuAlaGlu-426
486-ThrLeuAlaArgGluGlyIle-492
495-GlyGlyLysGlnAlaIle-500
510-IlePheAspLysThrGlyThrLeuThrGlnGlyLysProAlaValArgArg-526
528-SerLeuLeuArgGlyThrAspGluAlaPhe-537
545-LeuGluGlnGlnSerGluHisProLeu-553
560-CysArgIleSerAspGlySerValPro-568
570-IleAlaIleLysGlnArgLeuAsnArgIleGlyGluGlyVal-583
589-ValAsnGlyGluThrGln-594
605-AlaGluIleSerGlyLysGluProGlnThrGluGlyGlySer-619
637-AspProLeuLysAspSerAlaAlaGluAlaValArg-648
650-LeuAlaGlyLysAsnLeu-655
659-IleLeuSerGlyAspArgGluThrAlaVal-668
684-AlaMetProGluAspLysLeuGluTyr-692
694-LysAlaLeuGlnLysGluGlyLysLys-702
707-GlyAspGlyIleAsnAspAla-713
725-AlaAlaGlyGlyThrAspIleAlaArgAspGlyAlaAsp-737
743-GluAspLeuArgThr-747
753-AspGlnAlaArgArgThrArgHisIleIle-762
807-ArgLeuHisLysArgGlyLysMetGlnSerGluLysMetProSerGluGln-823

Hydrophilic Regions - Hopp-Woods
1-MetLysLysThrCys-5
21-ArgTyrGluAsnGluAspArgGluThrCys-30
50-TyrLysGlnArgThrAlaAspAlaGlnLysThrGluLeuProPro-64
77-ProGluValGlnSerAspPheValGlu-85
87-HisGlyGlyThrArgGluAla-93
112-GlnLeuLeuArgThrAspGlyIleVal-120
133-ValValTrpAspAspGlyLysIleArgLeu-142
160-AspAlaGlnLysIleGluAlaAlaAsnGlnLysGluArgLysGlnTyr-175
201-GlyAspIleGluProAspPhe-207
234-AlaLeuArgAspLeuLysAsnArgArgValGlyMet-245
293-IleAlaArgArgLysAlaGlyAspAlaAlaGluArgLeuVal-306
318-AspTyrProAspThrGlnGluThrCysGlu-327
329-AlaValValLysLeuLysAlaGlyAsp-337
374-LysMetProSerGluLysValThr-381
393-IleArgThrAspArgThrGlyGlyGlyThrArg-403
414-AlaLeuAlaGlnLysProArgThrAlaGluLeuAlaGlu-426
486-ThrLeuAlaArgGluGlyIle-492
518-ThrGlnGlyLysProAlaValArgArg-526
531-ArgGlyThrAspGlu-535
545-LeuGluGlnGlnSerGluHisProLeu-553
561-ArgIleSerAspGlySerVal-567
570-IleAlaIleLysGlnArgLeuAsnArgIleGlyGlu-581
607-IleSerGlyLysGluProGlnThrGluGlyGlyGly-618
638-ProLeuLysAspSerAlaAlaGluAlaValArg-648
661-SerGlyAspArgGluThrAlaVal-668
684-AlaMetProGluAspLysLeuGluTyr-692
694-LysAlaLeuGlnLysGluGlyLysLys-702
730-AspIleAlaArgAspGlyAlaAsp-737
743-GluAspLeuArgThr-747
753-AspGlnAlaArgArgThrArgHisIleIle-762
807-ArgLeuHisLysArgGlyLysMetGlnSerGluLysMetProSerGluGln-823

AMPHI Regions - AMPHI
67-LysIleLeuLeuLysLeu-72
104-AspProIleProAla-108
147-TyrMetGlnThrPheArgArgIleValAlaProGln-158
169-AsnGluPheIleGlyLeuPheLysAsn-177
183-ValValThrValThrGluLeuPheArgValAlaGln-194
196-ThrAlaAsnArgThr-200

Antigenic Index - Jameson-Wolf
13-ThrGluThrArgAlaAspMet-19
132-ValProLysGlyGlnTrpGlu-138
165-ProProLeuSerAsnGlu-170
193-AlaGlnGluThrAlaAsnArgThrTyrAsp-202
226-AlaArgLeuGluLysArgPheAspArgTyrValAla-237

Hydrophilic Regions - Hopp-Woods
13-ThrGluThrArgAlaAspMet-19
193-AlaGlnGluThrAlaAsnArgThr-200
226-AlaArgLeuGluLysArgPheAspArgTyrValAla-237
706
AMPHI Regions - AMPHI
9-LeuValSerArgTrpLeuAsnSerTyr-17
24-ArgLeuIleHisAlaValArg-30
70-IleTyrSerLysAlaValGluArgMetLeuGlyThrValIleGly-84
111-ThrAlaSerAlaLeuAlaGlyTrpAlaAla-120
153-ArgAlaMetAsnValLeu-158
183-LeuAlaAspAsnLeuAlaAspCysSerLysMetIleAlaGluIleSerAsnGlyArg-201
204-ThrArgGluArgLeuGluGluAsn-211
243-MetGluAlaMetGlnHisAlaHisArgLysIleVal-254
318-AlaLeuAlaGluHisLeuHis-324

Antigenic Index - Jameson-Wolf
1-MetAsnThrSerGlnArgAsnArgLeu-9
11-SerArgTrpLeuAsnSerTyrGluArgTyrArgTyrArgArg-24
73-LysAlaValGluArgMetLeu-79
97-HisTyrPheHisGlyAsnLeu-103
122-GlyLysAsnGlyTyrVal-127
140-GlyAspAsnGlySerGluTrpLeuAsp-148
186-AsnLeuAlaAspCysSerLysMetIleAlaGluIleSerAsnGlyArgArgMetThrArgGluArgLeuGlu
GluAsnMetAlaLysMetArgGlnIleAsn-219
221-ArgMetValLysSerArgSerHisLeuAlaAlaThrSerGlyGluSerArgIleSer-239
249-AlaHisArgLysIleValAsn-255
266-LysLeuGlnSerProLysLeuAsnGlySerGluIleArgLeuLeuAsp-281
300-GlyArgHisAlaArgArgIleArgIleAspThrAlaIleAsnProGluLeuGluAlaLeuAla-320
334-SerThrAsnMetArgGlnGluIle-341
349-GlnArgThrArgArgLysTrpLeuAspAlaHisGluArgGlnHisLeu-364
367-SerLeuLeuGluThrArgGluHisGly-375

Hydrophilic Regions - Hopp-Woods
3-ThrSerGlnArgAsnArgLeu-9
17-TyrGluArgTyrArgTyrArgArg-24
73-LysAlaValGluArgMetLeu-79
142-AsnGlySerGluTrpLeu-147
186-AsnLeuAlaAspCysSerLysMetIleAla-195
198-SerAsnGlyArgArgMetThrArgGluArgLeuGluGluAsnMetAlaLysMetArgGlnIleAsn-219

221-ArgMetValLysSerArgSerHis-228
232-ThrSerGlyGluSerArgIle-238
249-AlaHisArgLysIleValAsn-255
266-LysLeuGlnSerProLysLeuAsnGlySerGluIleArgLeuLeuAsp-281
301-ArgHisAlaArgArgIleArgIle-308
314-ProGluLeuGluAlaLeuAla-320
336-AsnMetArgGlnGluIle-341
349-GlnArgThrArgArgLysTrpLeuAspAlaHisGluArgGlnHisLeu-364
367-SerLeuLeuGluThrArgGluHisGly-375
707
AMPHI Regions - AMPHI
9-LeuIleArgSerMetGlnArgGln-16
88-AsnLeuSerArgLeuGlnLysAla-95
170-GluGlnGlyLeuGluAsnLeuArgArgLeuProSerVal-182
219-GlyGlyLysThrThrGlyLysTyr-226
241-SerAspLeuPheTyr-245
294-ArgTyrHisGluAlaThrGlu-300
339-ThrArgGlnThrTyrLysTyrIleAspAsp-348
539-HisLysProLysGlyPheGlnThrThrAsnThr-549

Antigenic Index - Jameson-Wolf
3-IleIleAsnAspAlaGluLeuIleArgSerMetGlnArgGlnGlnHisIleAsp-20
27-AlaAsnValArgPheGluGlnProLeuGluLysAsnAsnTyrValLeuSerGluAspGluThrProCysThrA
rg-51
56-SerLeuAspAspLysThrValArg-63
85-GlySerAsnAsnLeuSerArgLeuGlnLysAlaAla-96
114-ProGlnAsnMetAspSerGlyIleLeu-122
125-ArgValSerAlaGlyGluIleGlyAspIleArgTyrGluGluLysArgAspGlyLysSerAlaGluGlySer
Ile-149
157-ProLeuTyrArgAsnLysIleLeuAsn-165
167-ArgAspValGluGlnGlyLeuGluAsnLeuArgArgLeuProSerValLysThrAspIle-186
189-IleProSerGluGluGluGlyLysSerAspLeu-199
202-LysTrpGlnGlnAsnLysProIleArg-210
213-IleGlyIleAspAspAlaGlyGlyLysThrThrGlyLysTyrGlnGly-228
235-AspAsnProLeuGly-239
248-TyrGlyArgGlyLeuAlaHisLysThrAspLeuThrAspAlaThrGlyThrGluThrGluSerGlySerArg
SerTyr-273
288-PheAsnHisAsnGlyHisArgTyrHisGluAlaThrGluGlyTyrSerValAsnTyrAspTyrAsnGlyLys
GlnTyrGln-314
322-MetLeuTrpArgAsnArgLeuHisLysThrSerVal-333
341-GlnThrTyrLysTyrIleAspAspAlaGluIleGluValGlnArgArgArgSerAlaGlyTrpGluAlaGlu
LeuArgHis-367
374-TrpGlnLeuAspGlyLysLeuSerTyrLysArgGlyThrGlyMetArgGlnSerMetProAlaProGluGlu
AsnGlyGlyAspIleLeuProGlyThrSerArgMetLysIle-411
438-GlnTrpAsnLysThrPro-443
446-AlaGlnAspLysLeuSerIleGlySerArgTyrThrValArgGlyPheAspGlyGluGlnSerLeuPheGly
GluArgGlyPheTyrTrpGlnAsnThr-478
493-AlaAspTyrGlyArgValSerGlyGluSerAla-503
506-ValSerGlyLysGln-510
518-PheArgGlyGlyHisLysValGly-525
536-LysProLeuHisLysProLysGlyPheGln-545

Hydrophilic Regions - Hopp-Woods
3-IleIleAsnAspAlaGluLeuIleArgSerMetGlnArgGlnGlnHisIleAsp-20
27-AlaAsnValArgPheGluGlnProLeuGluLysAsnAsn-39

42-LeuSerGluAspGluThrProCys-49
56-SerLeuAspAspLysThrValArg-63
88-AsnLeuSerArgLeuGlnLysAlaAla-96
130-GluIleGlyAspIleArgTyrGluGluLysArgAspGlyLysSerAlaGluGlySer-148
167-ArgAspValGluGlnGlyLeuGluAsnLeuArgArgLeuProSerValLysThrAspIle-186
190-ProSerGluGluGluGlyLysSerAspLeu-199
213-IleGlyIleAspAspAlaGlyGlyLysThrThrGlyLysTyr-226
252-LeuAlaHisLysThrAspLeuThrAsp-260
262-ThrGlyThrGluThrGluSerGlySerArgSer-272
294-ArgTyrHisGluAlaThrGlu-300
345-TyrIleAspAspAlaGluIleGluValGlnArgArgArgSerAlaGlyTrp-361
363-AlaGluLeuArgHis-367
378-GlyLysLeuSerTyrLysArgGlyThrGlyMetArgGlnSerMetProAlaProGluGluAsnGlyGly-40
0
407-SerArgMetLysIle-411
446-AlaGlnAspLysLeuSerIle-452
460-GlyPheAspGlyGluGln-465
494-AspTyrGlyArgValSerGlyGluSer-502
537-ProLeuHisLysProLysGly-543
708
AMPHI Regions - AMPHI
26-ProSerArgAlaGluLysAlaAsnGlnValSerAsnIle-38
56-ThrAlaSerIleGluAspAlaLeuLysSerAspPro-67
79-IleTyrGlnTyrLeuLys-84
89-AlaGlnGluSerPhe-93
119-AsnArgProAlaGluSerMetAla-126
128-PheAspLysAlaLeu-132
142-IleAlaAsnLeuAsnLys-147
176-ProAlaPheLysGluLeuAlaArg-183
221-LysAlaLeuGlyAsnAlaGln-227

Antigenic Index - Jameson-Wolf
2-ProPheLysProSerLysArgIleSer-10
19-AlaCysSerThrSerTyrArgProSerArgAlaGluLysAlaAsnGln-34
46-TyrMetArgGlyGlnAspTyrArgGlnAlaThrAlaSerIleGluAspAlaLeuLysSerAspProLysAsnG
lu-70
84-LysValAsnAspLysAlaGlnGluSerPheArg-94
97-LeuSerIleLysProAspSerAlaGluIleAsnAsnAsnTyrGlyTrp-112
115-CysGlyArgLeuAsnArgProAlaGlu-123
131-AlaLeuAlaAspProThrTyrProThr-139
145-LeuAsnLysGlyIleCysSerAlaLysGlnGlyGln-156
176-ProAlaPheLysGluLeuAlaArgThrLysMet-186
191-LeuGlyAspAlaAspTyrTyrPheLysLysTyrGlnSerArgValGluValLeuGlnAlaAspAspLeu-21
3
240-PheProTyrSerGluGluLeuGln-247

Hydrophilic Regions - Hopp-Woods
4-LysProSerLysArgIle-9
24-TyrArgProSerArgAlaGluLysAlaAsnGln-34
46-TyrMetArgGlyGlnAspTyrArgGln-54
56-ThrAlaSerIleGluAspAlaLeuLysSerAspProLysAsnGlu-70
84-LysValAsnAspLysAlaGlnGluSerPheArg-94
99-IleLysProAspSerAlaGluIle-106
117-ArgLeuAsnArgProAlaGlu-123
149-IleCysSerAlaLysGlnGly-155

177-AlaPheLysGluLeuAlaArgThrLysMet-186
201-TyrGlnSerArgValGluValLeuGlnAlaAspAspLeu-213
709
AMPHI Regions - AMPHI
6-SerLeuLeuAspMetProArgGlyGlu-14
18-ValValValAlaLeuIleAlaAlaMetGly-27
37-ProHisMetSerIleIleAlaAlaIleValValLeu-48
54-AlaArgGlyLeuLysTyrAsn-60
64-GlnGlyMetIleGlyAlaLeuAsnGlnGly-73
115-SerSerPheAlaLeuCysSerVal-122
130-SerLeuThrThrCysAla-135
171-ProLeuSerAspThr-175
185-IleAspLeuPheGluHisIleLysAsnMetMetTyrThrThr-198
221-LeuAsnSerValGluSerPheArg-228
253-LeuMetArgIleAsnAla-258
261-AlaMetLeuPheThr-265
278-ThrProAspLeuArgGlnLeuGlyAlaTrpPhe-288
298-AlaPheLysAspValValLysLeuIleSerArgGlyGly-310
334-LeuGlyValIleProSerLeuLeuGluAlaIleArgThrPheLeuThr-349
382-ThrPheLysProVal-386
395-ArgAsnLeuSerArgThrLeuGluAspAlaGlyThrValIleAsnProLeuValProTrpSerValCysGly
ValPheIleSerHis-423

Antigenic Index - Jameson-Wolf
8-LeuAspMetProArgGlyGluAla-15
55-ArgGlyLeuLysTyrAsnAspMetGln-63
165-PheGlyAspLysMetSerProLeuSerAspThrThrGly-177
222-AsnSerValGluSerPheArgSerGlnLeuGlu-232
277-SerThrProAspLeuArgGln-283
290-GlyGlyTyrLysLeuGluGlyGluAlaPheLysAspValVal-303
306-IleSerArgGlyGlyLeuGlu-312
378-LeuSerGlyGluThrPheLysProValTyrAspLysLeuGlyLeuHisSerArgAsnLeuSerArgThrLeu
GluAspAlaGlyThr-406

Hydrophilic Regions - Hopp-Woods
8-LeuAspMetProArgGlyGluAla-15
57-LeuLysTyrAsnAspMetGln-63
168-LysMetSerProLeuSerAsp-174
225-GluSerPheArgSerGlnLeuGlu-232
279-ProAspLeuArgGln-283
293-LysLeuGluGlyGluAlaPheLysAspValVal-303
396-AsnLeuSerArgThrLeuGluAspAlaGly-405
710
AMPHI Regions - AMPHI
6-LysIleArgLeuMetArgGluLeuAsnLysTrpSerGln-18
31-GlyTyrAlaLysIleGlu-36
45-ProArgLeuGluGlnLeuAlaGlnIlePheLysIleAspMetTrpAspLeuLeuLys-63
104-CysLysGluMetLeuGlu-109

Antigenic Index - Jameson-Wolf
1-MetGluThrHisGluLysIleArgLeuMetArgGluLeuAsnLysTrpSerGlnGluAspMetAlaGluLysLe
uAla-26
33-AlaLysIleGluArgGlyGluThrGlnLeuAsnIleProArgLeuGluGln-49
62-LeuLysSerGlyGlyGlyGly-68
73-IleAsnGluGlyAspSerGlyGlyAsp-81

86-AlaSerGlyAspValSerMet-92
95-GluPheLeuLysMetGluLeuLysHisCysLysGluMetLeuGluGlnLysAspLysGluIleGluLeuLeuA
rgLysLeuThrGlu-123

Hydrophilic Regions - Hopp-Woods
1-MetGluThrHisGluLysIleArgLeuMetArgGluLeuAsnLysTrpSerGlnGluAspMetAlaGluLysLe
uAla-26
33-AlaLysIleGluArgGlyGluThr-40
45-ProArgLeuGluGln-49
74-AsnGluGlyAspSerGlyGly-80
95-GluPheLeuLysMetGluLeuLysHisCysLysGluMetLeuGluGlnLysAspLysGluIleGluLeuLeuA
rgLysLeuThrGlu-123
711
AMPHI Regions - AMPHI
28-AlaGluSerTyrArgAsnLeuThrAlaSerGluIleAlaLysValTyrThrIleAlaArgMetThrAspLeuA
spMetLeuAsnAspIleLys-58
67-SerGlyGlnSerPheAspAspTrpArgLysGlyIleLeu-79
95-GlyLysAspIleIleAspProAlaThrGlyGluValPheGlySerProArgArgLeuGluThrIleTyrArgT
hrAsnMet-121
128-GlyGlnTyrGlnGlyTyrMet-134
158-SerAlaIleAspGly-162
195-ValGluArgGlnGly-199
203-GlyGlnSerThrAlaAspAsnLeuValGluThrHis-214
258-LysTyrAspArgAlaLeuAlaHisGlnPheAla-268
281-PheLysGlnLeuGluLysGluPheTyr-289
329-GlnGluLeuAlaGlyMetThr-335
352-SerArgGluGlyGlnAsnPhe-358
360-AspSerTyrTyrAlaPheLeuProAspMetLeuGlnAsnProGlu-374
395-TrpAlaValLeuLysTyrIleLysGluValAspGluIle-407
413-ArgIleSerAsnAspLysGluIleAlaLys-422

Antigenic Index - Jameson-Wolf
11-SerLeuProProLysLysAlaIleGlu-19
21-LeuGluSerLysLysValThrAlaGluSerTyrArgAsnLeuThr-35
55-AsnAspIleLysThrSerMet-61
63-GluSerAlaLysSerGlyGlnSerPheAspAspTrpArgLysGlyIle-78
82-LeuSerAsnLysGlyTrpLeuHisProAsnGlyHisAsnGlyLysAspIleIleAspProAlaThrGlyGluV
alPheGlySerProArgArgLeuGluThrIleTyrArgThrAsnMet-121
126-AsnAlaGlyGlnTyrGlnGly-132
135-AlaAsnIleAspAlaArgProTyrTrp-143
147-AlaValGlyAspSerArgThrArgProAlaHisSerAla-159
165-TyrArgTyrAspAspProPheTrp-172
177-ProProAsnGlyTyrAsnCysArgCysSer-186
190-LeuSerGluArgAspValGluArgGlnGlyArgIleValGlyGlnSerThrAlaAspAsnLeuValGlu-21
2
215-LysIleTyrAsnLysLysGlyAspThr-223
229-TyrLysAlaProAspGlySerLeuTyrThrThrAspArgGlyPheAspTyrAsnAlaGlyArgMetAsnTyr
ArgProAspLeuAspLysTyrAspArgAlaLeu-263
268-AlaLysAlaGluMetGlyGlyAlaAspPheLysThrSerPheLysGlnLeuGluLysGluPheTyrGluVal
LysGlnArgLeuAspIleAspGlyLysProAspLysGluGlnLysIleLysIleArgAsnAlaLeu-313
324-LeuSerLysGluThrGlnGlu-330
342-SerAspAspThrLeuValLysGlnValAspSerArgGluGlyGlnAsnPheAspAspSerTyrTyr-363
370-LeuGlnAsnProGluHisValIleArgAspAsnArgGlu-382
387-AlaArgTyrLysGlySer-392
400-TyrIleLysGluValAspGlu-406

411-SerTyrArgIleSerAsnAspLysGluIleAla-421
424-MetAlaLysLysLysValLeuLys-431

Hydrophilic Regions - Hopp-Woods
13-ProProLysLysAlaIleGlu-19
21-LeuGluSerLysLysValThrAlaGluSerTyrArg-32
55-AsnAspIleLysThrSerMet-61
63-GluSerAlaLysSerGlyGlnSerPheAspAspTrpArgLys-76
93-HisAsnGlyLysAspIleIleAsp-100
108-GlySerProArgArgLeuGluThr-115
147-AlaValGlyAspSerArgThrArgProAlaHisSerAla-159
190-LeuSerGluArgAspValGluArgGlnGlyArgIleVal-202
215-LysIleTyrAsnLysLysGlyAspThr-223
238-ThrThrAspArgGlyPheAsp-244
250-MetAsnTyrArgProAspLeuAspLysTyrAspArgAlaLeu-263
268-AlaLysAlaGluMetGlyGlyAlaAspPheLysThrSerPheLysGlnLeuGluLysGluPheTyrGluVal
LysGlnArgLeuAspIleAspGlyLysProAspLysGluGlnLysIleLysIleArgAsnAlaLeu-313
324-LeuSerLysGluThrGlnGlu-330
344-AspThrLeuValLysGlnValAspSerArgGluGlyGlnAsnPheAsp-359
375-HisValIleArgAspAsnArgGlu-382
400-TyrIleLysGluValAspGlu-406
414-IleSerAsnAspLysGluIleAla-421
424-MetAlaLysLysLysValLeuLys-431
712
AMPHI Regions - AMPHI
12-GlySerIleArgVal-16
29-ValGlnGlyLeuProGlnAsnPro-36
55-GluProValGlnLeuPhe-60
72-GlySerLeuAlaHisLeuMet-78
131-SerThrAlaValAsn-135
142-ThrValAlaAspArgLeuLys-148
210-ThrAlaLeuSerLysValAla-216
231-AlaAsnAlaLysAlaLeuSerAsnHisIleThrAsnValSerAsnAlaIle-247
306-ProAlaLysProLeuAsnThrLeuGlu-314
329-PheAlaGluCysAsnAsnAlaLeuTyrAsnGlyLeuThrProLeu-343
352-IleMetArgAlaValSerThrTyrThrLysSerAlaAsnAsn-365
374-IleThrThrIleArgThrLeuAspTyrValArgArgSerVal-387
411-GluIleLeuAspValLeuIle-417
421-GlnAlaGluIleIleGluAsn-427
441-GlnAsnAspProAsn-445
454-AspValValAsnGlyLeu-459

Antigenic Index - Jameson-Wolf
6-AspPheAspThrIleProGlySerIleArgValProGlyGln-19
23-PheAsnThrArgAsnAlaVal-29
32-LeuProGlnAsnProGlnLys-38
61-SerAspAlaGluAlaAlaAsp-67
125-IleGlyGlyLysGlnVal-130
134-ValAsnThrGlyGluThrAla-140
143-ValAlaAspArgLeuLysThr-149
171-AlaLysHisLysGlyGluIleGlyAsnGluSerGlyLeu-183
201-GlyGlyAlaLysAsnAlaAsp-207
215-ValAlaGlyLysHis-219
225-SerProPheSerAspAspAlaAsnAlaLysAlaLeuSer-237
243-ValSerAsnAlaIleGluGlnArgGlyCys-252

268-AlaThrGlyGluIleAsnAspGlyArgMet-277
284-GlyAlaValGluProAsnGly-290
302-PheGluGluAspProAlaLysProLeuAsn-311
313-LeuGluIleLysGly-317
320-ValThrProAspAlaGln-325
332-CysAsnAsnAlaLeuTyrAsnGly-339
358-ThrTyrThrLysSerAlaAsnAsnThrAspAspProAlaLeu-371
381-AspTyrValArgArgSerValLysGluArgIleAlaLeuArgPheProArgAspLysLeuSerAspArgLeu
LeuProLysValLysSerGluIle-412
419-LeuAspGlnAlaGluIleIleGluAsnAlaGluAlaAsnLysGlyLysLeuValVal-437
440-AlaGlnAsnAspProAsnArgValAsnAla-449

Hydrophilic Regions - Hopp-Woods
61-SerAspAlaGluAlaAlaAsp-67
135-AsnThrGlyGluThr-139
143-ValAlaAspArgLeuLysThr-149
171-AlaLysHisLysGlyGluIleGlyAsn-179
203-AlaLysAsnAlaAsp-207
227-PheSerAspAspAlaAsnAlaLysAlaLeu-236
247-IleGluGlnArgGly-251
270-GlyGluIleAsnAspGlyArgMet-277
302-PheGluGluAspProAlaLysPro-309
313-LeuGluIleLysGly-317
362-SerAlaAsnAsnThrAspAspProAlaLeu-371
381-AspTyrValArgArgSerValLysGluArgIleAla-392
395-PheProArgAspLysLeuSerAspArgLeuLeuProLysValLysSerGluIle-412
419-LeuAspGlnAlaGluIleIleGluAsnAlaGluAlaAsnLysGlyLysLeuValVal-437
440-AlaGlnAsnAspProAsnArg-446
713
AMPHI Regions - AMPHI
18-GluHisArgHisTrpGlu-23
115-AspAlaAlaLysLysLeuAlaAlaProTrpProGlnIle-127
150-ThrValTrpGlnAlaLeuThrHisIleAlaAsnSerVal-162
257-AspAsnLeuAlaAlaLeuGln-263
265-GlnAlaLysLysGln-269

Antigenic Index - Jameson-Wolf
1-MetGlnAsnAsnSerTyrGly-7
13-ArgValGlyGlyLysGluHisArgHisTrpGluArgTyrAspIleAspSerAspPhe-31
44-ArgLeuGlyProGluAlaAlaIleProAspLeuSerGlyGluSerCysGluValValIle-63
74-GlySerGlnArgHisGlyLysSerLysGlySerArgGluLeuSerLeuSerGlyArgAspLeu-94
106-LeuAsnValLysGly-110
115-AspAlaAlaLysLysLeu-120
131-ValLeuLysAlaGluAsnAsnProAlaLeuGlyLysIleAspIleGluProGlyGlu-149
167-TrpLeuGluProAspGlyThrLeu-174
177-GlyGlyAlaAspTyrSerSerProPro-185
192-SerArgThrAspSerArgCysAsnIleGluArgMetAspIleGluTrpAspThrAspAsnArgPheSerGlu
-215
222-SerHisGlyArgSerGlyAspSerAlaLysHisAspLeu-234
237-ValTyrLysAspProThrMetThrLeuHisArgProLysThrValVal-252
254-SerAspAlaAspAsn-258
263-GlnLysGlnAlaLysLysGlnLeuAla-271
284-ValGlyGlyHisLysThrArgAspGly-292
303-ValIleAspAspGluHisGlyIle-310

321-PheMetLeuSerArgMetAspGlyThrGlnThrGluLeuArgLeuLysGluAspGlyIleTrpThrProAsp
AlaTyrProLysLysAlaGluAlaAlaArgLysArgLysGlyLysArgLysGlyValSerHisLysGlyLysLysG
lyGlyLysLysGlnAlaGlu-376

Hydrophilic Regions - Hopp-Woods
14-ValGlyGlyLysGluHisArgHisTrpGluArgTyrAspIleAspSer-29
54-LeuSerGlyGluSerCysGluValValIle-63
76-GlnArgHisGlyLysSerLysGlySerArgGluLeuSerLeuSerGlyArgAspLeu-94
115-AspAlaAlaLysLysLeu-120
131-ValLeuLysAlaGluAsnAsnProAla-139
141-GlyLysIleAspIleGluProGlyGlu-149
168-LeuGluProAspGly-172
193-ArgThrAspSerArgCysAsnIleGluArgMetAspIleGluTrpAspThrAspAsnArgPheSer-214
222-SerHisGlyArgSerGlyAspSerAlaLysHisAspLeu-234
246-HisArgProLysThr-250
254-SerAspAlaAspAsn-258
263-GlnLysGlnAlaLysLysGlnLeuAla-271
286-GlyHisLysThrArgAsp-291
303-ValIleAspAspGluHisGlyIle-310
325-ArgMetAspGlyThrGlnThrGluLeuArgLeuLysGluAspGlyIleTrp-341
345-AlaTyrProLysLysAlaGluAlaAlaArgLysArgLysGlyLysArgLysGlyValSerHisLysGlyLys
LysGlyGlyLysLysGlnAlaGlu-376
714
AMPHI Regions - AMPHI
6-IleLeuArgGlyLeuLeuPro-12
34-LeuAspAlaValAlaGluSerAlaGlnSerValAla-45
54-GlyGlnMetLeuAlaAspTrpGluArgValLeuGlyLeu-66
79-AlaValMetAlaLysLeuAsnGluThrGly-88
98-LeuAlaGluAlaAla-102
110-GluProGlnProPhe-114
116-AlaGlyValAsnArgAlaGlyAspArgLeu-125
155-AlaGlyAspArgLeuThrAspTyrSerAspAlaValIleGluSerLeuPheAsnArgLeuLys-175

Antigenic Index - Jameson-Wolf
15-SerTyrAlaArgAsnAlaProArgValArgAlaGlnAlaGluIleAspGlyAlaAla-33
36-AlaValAlaGluSerAlaGlnSerVal-44
46-AspAlaValAspProArgSerAla-53
64-LeuGlyLeuAspGlyThrGlyLysAsnArgGlnHisArg-76
83-LysLeuAsnGluThrGlyGlyLeu-90
107-GlnIleAspGluProGlnProPheArgAlaGlyValAsnArgAlaGlyAspArgLeuAlaPro-127
138-ValArgGlyGlyAsnAsnArgIleThrArgPheArgAlaGlyIle-152
154-AlaAlaGlyAspArgLeuThrAspTyrSerAspAlaValIle-167
170-LeuPheAsnArgLeuLysPro-176

Hydrophilic Regions - Hopp-Woods
18-ArgAsnAlaProArgValArgAlaGlnAlaGluIleAspGlyAlaAla-33
36-AlaValAlaGluSerAlaGlnSerVal-44
46-AspAlaValAspProArgSerAla-53
68-GlyThrGlyLysAsnArgGlnHisArg-76
107-GlnIleAspGluProGlnProPhe-114
117-GlyValAsnArgAlaGlyAspArgLeuAlaPro-127
139-ArgGlyGlyAsnAsnArgIleThrArgPheArgAla-150
154-AlaAlaGlyAspArgLeuThrAspTyrSerAspAlaValIle-167
170-LeuPheAsnArgLeuLysPro-176
715

AMPHI Regions - AMPHI
15-GlnIleGluArgLeuGlyAsnGlyIle-23
31-ArgArgLeuSerGluThrMetHis-38
64-LeuSerAspSerGlyArgLeuLysAspSerPheSer-75
94-IleHisAsnPheGlyGly-99

Antigenic Index - Jameson-Wolf
15-GlnIleGluArgLeuGlyAsnGlyIleGluAsnArgTyrLeuLeu-29
47-TyrAlaGlyArgProLysTrpValGlyLeuLysTyrArgAspGlyLysProLeuSerAspSerGlyArgLeuL
ysAspSerPheSerThrLeuSerAspAsnAspThrAla-83
98-GlyGlyMetAlaGlyArgAsnArgLysValArgIleProGlnArgGluPhe-114
118-ThrAspAspAspLysGlnAlaLeuMetAspAspValGlnAsp-131

Hydrophilic Regions - Hopp-Woods
15-GlnIleGluArgLeuGlyAsn-21
57-LysTyrArgAspGlyLysProLeuSerAspSerGlyArgLeuLysAspSerPhe-74
78-SerAspAsnAspThr-82
101-AlaGlyArgAsnArgLysValArgIleProGlnArgGlu-113
118-ThrAspAspAspLysGlnAlaLeuMetAspAspValGlnAsp-131
716
AMPHI Regions - AMPHI
33-GlyValHisLysSerAlaHisGly-40
71-AlaThrValLysLysThrHisLysHisThrLysAla-82

Antigenic Index - Jameson-Wolf
1-MetAsnLysAsnIle-5
23-AlaAlaAsnLysProAlaSerAsnAlaThrGlyValHisLysSerAlaHisGlySerCysGlyAlaSerLysS
erAlaGluGlySerCysGlyAlaAlaGlySerLysAlaGlyGluGlyLysCysGlyGluGlyLysCysGlyAlaTh
rValLysLysThrHisLysHisThrLysAlaSerLysAlaLysAlaLysSerAlaGluGlyLysCysGlyGluGly
LysCysGlySerLys-102

Hydrophilic Regions - Hopp-Woods
23-AlaAlaAsnLysProAlaSer-29
33-GlyValHisLysSerAlaHis-39
43-GlyAlaSerLysSerAlaGluGlySerCys-52
55-AlaGlySerLysAlaGlyGluGlyLysCysGlyGluGlyLysCys-69
71-AlaThrValLysLysThrHisLysHisThrLysAlaSerLysAlaLysAlaLysSerAlaGluGlyLysCysG
lyGluGlyLysCysGlySerLys-102
717
AMPHI Regions - AMPHI
175-AlaValTyrAlaLeuAlaAsn-181
209-LeuHisArgGlyLeu-213
223-SerIleAlaTyrTrp-227
241-AlaGlyLeuGluGlnLeuGly-247
263-GlnSerIlePheSerThrValTrpThrProTyrIlePheArgAlaIleGluGlu-280
305-ThrGlyIlePheSerProLeuAlaSer-313
347-LeuAsnValValArgLysThr-353
358-LeuAlaThrLeuGlyAlaLeuAla-365
401-SerSerCysArgLeuTrpGlnProLeuLysArgLeu-412
430-CysPheGlyThrPro-434
442-GlyValTrpAlaAlaTyrLeuAlaGly-450
457-LysAspLeuHisLysLeuPheHisTyr-465

Antigenic Index - Jameson-Wolf
1-MetAspThrLysGlu-5

32-ProAlaAspAspIleGlyArg-38
66-TyrAlaThrAlaAspLysAspThrLeu-74
95-SerArgProSerLeuProSerGluIle-103
135-MetGluGlyArgAla-139
192-AsnArgCysArgLeuLysAlaValArg-200
231-SerAlaAspArgLeuPheLeu-237
277-AlaIleGluGluAsnAlaProProAlaArgLeu-287
289-AlaThrAlaGluSer-293
317-ProGluAsnTyrAla-321
349-ValValArgLysThrArgProIleAla-357
376-ProSerGlyGlyAlaArgGly-382
397-PheLysThrGluSerSerCysArgLeu-405
453-LeuArgHisArgLysAspLeuHis-460

Hydrophilic Regions - Hopp-Woods
1-MetAspThrLysGlu-5
66-TyrAlaThrAlaAspLysAspThrLeu-74
135-MetGluGlyArgAla-139
192-AsnArgCysArgLeuLysAlaValArg-200
277-AlaIleGluGluAsnAlaProProAlaArgLeu-287
289-AlaThrAlaGluSer-293
349-ValValArgLysThrArgPro-355
378-GlyGlyAlaArgGly-382
398-LysThrGluSerSerCys-403
453-LeuArgHisArgLysAspLeuHis-460
718-1
AMPHI Regions - AMPHI
28-IleThrAlaThrGlyArgValIleAlaGluHisProSerAsnPheIleThrProGln-46
49-ArgAlaLeuPheGlu-53
110-AspGlnAlaTyrGluMetMetAspSerLeuProThr-121
124-AspLeuIleMetAspLeuMetAspAlaValGlyHisGly-136
160-ProGlnSerTrpPheLys-165
198-ArgSerValGlnGln-202
210-ThrLeuSerTrpLeuTyrMetPhe-217
219-HisTyrAlaValHisAspPheAlaGluPheLeuGluLeu-231
255-ArgAlaValAlaGluIle-260
280-AlaAsnGlyThrThr-284
320-ThrAsnAlaLeuGlyAsnIleHisAsnGluValArg-331
341-GlnValAlaGlnThrIleThrSerGlnIleIleGlyProPhe-354
363-AspProAsnArgVal-367
376-GluProLysAspIleAlaValPheAlaAspAlaIleProLysLeuValAsp-392
395-ValGlnIleProGlu-399
420-ArgGlnValProAspAsnPro-426
448-HisGlnGluIleLeuAspGlyAlaLeuAspAsp-458
469-LeuAsnProMetValArgGlnAlaValAlaAlaLeuAsnAlaCysAsnSerTyrGlu-487

Antigenic Index - Jameson-Wolf
4-IleMetAlaLysLysAsnAsnLysThrLysIleGlnLysProGluAlaAlaLeu-21
30-AlaThrGlyArgValIleAla-36
38-HisProSerAsnPhe-42
44-ThrProGlnLysMetArgAlaLeuPheGluAspAlaGluSerGlyAspIleArgAlaGlnHis-64
68-AlaAspIleGluGluArgAspSerAspIle-77
81-MetGlyThrArgLysArgAla-87
95-ValAlaProProArgAsnAlaThrProGluGluGluLysLeuSerAspGlnAlaTyrGluMet-115
119-LeuProThrLeuGlu-123

148-AspGlyLeuTyrLeuProArgAsnPheIleHisArgProGlnSerTrpPheLysTrpAspLysAspAsnGly
Leu-172
174-LeuArgThrArgGluAsnProGluGlyGluAla-184
193-HisThrGlnLysSerArgSerValGlnGlnAlaArgAsnGlyLeuPhe-208
237-ArgIleGlyLysTyrGlyAlaGlyAlaThrLysGluGluLysAsnThrLeu-253
268-MetProGluGlyMetGluIleGluLeu-276
280-AlaAsnGlyThrThrAlaThr-286
295-AspTrpCysGluLysSerAlaAla-302
310-LeuThrSerGlyAlaAspGlyLysSerSerThrAsnAlaLeuGly-324
328-AsnGluValArgArgAspLeuLeuValSerAspAlaLysGlnVal-342
359-TyrProHisAlaAspProAsnArgValProLysPheGlyPheAspThrArgGluProLysAspIle-380
397-IleProGluSerTrpValArgAspLysLeuVal-407
410-AspValGlnGluGlyGluAlaValLeu-418
420-ArgGlnValProAspAsnProValAsnArg-429
440-ValProSerLysAlaThrGlyArgHisGlnGluIleLeuAspGlyAlaLeuAsp-457
459-AlaLeuValGluProAspPheAsnSerGlnLeu-469
484-AsnSerTyrGluGluAlaAspAla-491
499-AsnLeuAspAsnAlaLysLeuArgThr-507
519-LeuGlyGlnAspHisAlaArgAla-526

Hydrophilic Regions - Hopp-Woods
4-IleMetAlaLysLysAsnAsnLysThrLysIleGlnLysProGluAlaAlaLeu-21
46-GlnLysMetArgAlaLeuPheGluAspAlaGluSerGlyAspIleArgAlaGlnHis-64
68-AlaAspIleGluGluArgAspSerAspIle-77
81-MetGlyThrArgLysArgAla-87
96-AlaProProArgAsnAlaThrProGluGluGluLysLeuSerAspGlnAlaTyrGluMet-115
165-LysTrpAspLysAspAsnGlyLeu-172
174-LeuArgThrArgGluAsnProGluGlyGluAla-184
195-GlnLysSerArgSerValGlnGlnAlaArg-204
245-AlaThrLysGluGluLysAsnThrLeu-253
270-GluGlyMetGluIleGluLeu-276
295-AspTrpCysGluLysSerAlaAla-302
312-SerGlyAlaAspGlyLysSerSerThr-320
328-AsnGluValArgArgAspLeuLeuValSerAspAlaLysGlnVal-342
363-AspProAsnArgValProLysPheGluPheAspThrArgGluProLysAsp-379
401-TrpValArgAspLysLeuVal-407
410-AspValGlnGluGlyGluAlaValLeu-418
421-GlnValProAspAsnProValAsn-428
440-ValProSerLysAlaThrGlyArgHisGlnGluIleLeuAspGlyAlaLeuAsp-457
485-SerTyrGluGluAlaAspAla-491
501-AspAsnAlaLysLeu-505
522-AspHisAlaArgAla-526
719
AMPHI Regions - AMPHI
21-ArgLeuLeuAlaAspThrGlnArgGlnLeuAspArgThrAla-34
68-AlaPheAsnArgLeuAlaArgSerGlyLys-77
79-SerGlnAsnAspLeu-83
104-GlyThrGlyPheAlaAspLysMetGlyLysIleGlyArgPheGlyAla-119
143-AspGluAsnIleAsnArgValSerArg-151
191-AlaLeuAspLeuIleSerGlyMetMet-199
229-ThrAlaLysLeuIleLysThrLeuLysAsp-238
254-LeuGlnSerGlyLeu-258
266-AspMetValArgGluLeuProSerLeuLeuSer-276
280-GlnAlaGlyMetAsnGlyValGlyGlyLeuAspTyrLeuLeuSerLeuLeu-296
308-GluAlaAlaThrAsnValGlnAsnLeuLeuSerLys-319

324-AspThrIleGlyArgLeuLysLysMetAlaAsnProAsnAspProLysLysGlyValAspTrpIleGlySer
-347
360-GlnValLeuSerArgLeuAlaAsp-367
404-GlnLeuLeuProAspLeu-409
418-AlaThrAspMetThrGlnIleArgGluTyrMetAlaSerLeu-431
467-GluSerLeuThrGlyThr-472
477-GluThrSerPheLysLysLeuAlaAlaGlu-486
497-LeuThrThrAlaAla-501
519-GlyPheLeuLysAspValGly-525
557-AlaGlySerGlyLeu-561
588-LeuProLysGlyLeuArgGlyThr-595
597-ThrThrProGluMetIleAsnArgLeuLys-606
626-ProGlnTyrLeuAlaAlaPro-632
635-GlnProThrAspLysMetLeuSerProLeuPhe-645
676-ThrGlyLeuAlaGlnValGlnSerAlaMetAla-686
707-AsnGluValSerArg-711

Antigenic Index - Jameson-Wolf
1-MetAlaAsnGlyAsnMet-6
14-AlaArgAspAspGlyAlaArgArgLeuLeuAlaAspThrGlnArgGlnLeuAspArgThrAlaLysSerArgA
laGlnLeuGluArgGlnSerHisThrTyr-47
51-GlyIleArgSerGluLysGlnIleGlnArg-60
71-ArgLeuAlaArgSerGlyLysAlaSerGlnAsnAspLeuAlaArg-85
90-ThrArgAsnArgIleArgGluLeuAsnAlaGluLeuLysGlnGlyThrGlyPheAlaAspLysMetGlyLysI
leGlyArgPheGly-118
134-ProAlaMetAspAsnArgLysGlnLeuAspGluAsnIleAsnArgValSerArg-151
153-AlaPheIleGluAspAsnSerLysSerAla-162
168-GluGlyAlaGlnGlnIleLysAspLeuAla-177
180-LeuValGluLysAsnGlyGlyThrHisAspLysAlaLeuAsp-193
207-GlnThrLysAsnGluAla-212
222-SerGluGlySerGlyGluAspThrAlaLysLeu-232
234-LysThrLeuLysAspGlyGlyMetSerGlyLysAspLeuGlnLeu-248
256-SerGlyLeuAspGlyThrPheGluValArgAspMetValArgGluLeuProSer-273
299-AlaAlaAsnLysSerGlySerProAlaGluAla-309
318-SerLysThrLeuSerProAspThrIleGlyArgLeuLysLysMetAlaAsnProAsnAspProLysLysGly
ValAspTrp-344
349-ValGlnGlyLysGlnAsnGlyGluAsn-357
369-MetLeuValLysAspLysGlnTyrGlnAspTyrLysLysArgAlaAlaAlaGlyAspLysThrAlaAlaGlu
Gln-393
422-ThrGlnIleArgGluTyrMet-428
437-AspAsnGlyLysIleAlaLysAsnAsnGluAlaArgMet-449
454-AlaGlnGlnGluGlnGlnGluSer-461
463-AlaMetLeuArgGluSerLeu-469
474-ValAspMetGluThrSerPheLysLysLeuAlaAla-485
511-ThrAlaGlyGlyGlyLysGlyAlaGlyPhe-520
522-LysAspValGlySerLysAla-528
532-GlyLysAlaSerAlaGlyGly-538
545-AlaAlaGlyGlyLys-549
554-GlyLysSerAlaGlySerGlyLeuMetAsnAsnProAlaLeuValLysArgAlaGly-572
580-SerCluSerLeuGlyAspGlyThrLeuProLysGlyLeuArgGlyThrLysThrThrPro-599
601-MetIleAsnArgLeuLysAsnAsnGlyIleArgPheGluProAlaProLysArgGluGlnAlaArgGlyGly
ValPro-626
631-AlaProSerAlaGlnProThrAspLysMetLeuSerPro-643
687-SerAlaSerGlnThrIleAsnThrAsnValSerLeuAsnIleAspGlyArgValIleAla-706
708-GluValSerArgTyrGln-713

718-GlyArgGlyAlaGlyGln-723

Hydrophilic Regions - Hopp-Woods
14-AlaArgAspAspGlyAlaArgArgLeuLeuAlaAspThrGlnArgGlnLeuAspArgThrAlaLysSerArgA
laGlnLeuGluArgGlnSer-44
52-IleArgSerGluLysGlnIleGlnArg-60
71-ArgLeuAlaArgSerGlyLysAlaSerGlnAsnAspLeuAlaArg-85
90-ThrArgAsnArgIleArgGluLeuAsnAlaGluLeuLysGln-103
107-PheAlaAspLysMetGlyLysIleGlyArg-116
134-ProAlaMetAspAsnArgLysGlnLeuAspGluAsnIleAsnArgValSerArg-151
153-AlaPheIleGluAspAsnSerLys-160
168-GluGlyAlaGlnGlnIleLysAspLeuAla-177
180-LeuValGluLysAsnGlyGlyThrHisAspLysAlaLeuAsp-193
207-GlnThrLysAsnGluAla-212
222-SerGluGlySerGlyGluAspThrAlaLysLeu-232
234-LysThrLeuLysAspGlyGlyMetSerGlyLysAspLeuGlnLeu-248
262-PheGluValArgAspMetValArgGluLeuPro-272
299-AlaAlaAsnLysSerGlySerProAlaGluAla-309
325-ThrIleGlyArgLeuLysLysMetAlaAsnProAsnAspProLysLysGlyVal-342
349-ValGlnGlyLysGlnAsnGlyGluAsn-357
369-MetLeuValLysAspLysGlnTyrGlnAspTyrLysLysArgAlaAlaAlaGlyAspLysThrAlaAlaGlu
Gln-393
422-ThrGlnIleArgGluTyrMet-428
437-AspAsnGlyLysIleAlaLysAsnAsnGluAlaArgMet-449
454-AlaGlnGlnGluGlnGlnGluSer-461
463-AlaMetLeuArgGluSerLeu-469
474-ValAspMetGluThrSerPheLysLysLeuAlaAla-485
522-LysAspValGlySer-526
567-LeuValLysArgAlaGly-572
590-LysGlyLeuArgGlyThrLysThrThrPro-599
601-MetIleAsnArgLeuLysAsnAsnGlyIleArgPheGluProAlaProLysArgGluGlnAlaArgGlyGly
-624
635-GlnProThrAspLysMetLeu-641
700-IleAspGlyArgValIleAla-706
720
AMPHI Regions - AMPHI
6-ThrLeuLeuGlnAspAlaSer-12
24-AspGluSerAsnGlyLysAlaLeuAlaGluHisAlaArgProPhe-38
65-TyrAlaGlyArgLeuLysLysLeuLeuAspAlaLeuGluGlnPro-79
87-ProValTrpGlyArgMetHisAsnMetIleAlaAla-98
142-IleAlaAsnIleAspThrTyrArg-149
166-ValSerAlaLeuTrpGlySerAlaLeuGly-175
184-PheGlyAlaValArgArgLeuPheAspLeuAspLysIleAla-197
212-GlySerAlaLysLeuPheAlaAspIleSerVal-222
268-LeuThrGlyArgPheSerAspGlyLeuGlnAsnArgLeuAsnArgLeu-283
293-GlnAlaValArgLeuLeuSerThrSer-301
320-AlaProAspLeuIleGluValAsn-327
340-AlaLeuArgAlaValGlnThrAla-347
365-GlnThrAlaGluSerLeu-370
376-ArgLeuAsnAlaLeuValAla-382
400-GlyThrIleHisGlnIleAlaHisGluPheTyrGlyAspIleAlaArgAlaAlaGluLeuVal-420

Antigenic Index - Jameson-Wolf
8-LeuGlnAspAlaSerTyrLysGlyValGlyPhe-18
21-GluValValAspGluSerAsnGlyLysAlaLeuAlaGluHisAlaArg-36

42-IleAspLeuGluAspMetGlyMetThrGlyArg-52
62-GlyLysGlyTyrAlaGlyArgLeuLysLysLeuLeuAspAlaLeuGluGlnProGlyGlyGly-82
101-SerTyrArgHisGluAlaAspTyr-108
117-ThrPheArgGluAlaAlaGluAlaGln-125
146-AspThrTyrArgGluAlaAla-152
189-ArgLeuPheAspLeuAspLys-195
197-AlaPheProAspArgGlyGlyTyrSer-205
209-PheLysAsnGlySer-213
226-ThrGlyIleArgArgGluAlaGlyLeu-234
244-TrpSerProArgGlnArgPheAspGly-252
256-ValAlaAspArgAlaAlaAlaIleProAspAsn-266
270-GlyArgPheSerAspGlyLeuGlnAsnArgLeuAsnArgLeuThrAlaLysGlnVal-288
313-AlaHisGlyGluGluMetThrAla-320
322-AspLeuIleGluValAsnArgAlaMetArgArgArgMetGlnAla-336
348-AlaAlaGluSerGlyGlyLeuThrAla-356
365-GlnThrAlaGluSerLeuArgAlaAlaAla-374
386-AsnGlnLysProProLeu-391
395-GlnAlaProIleAspGlyThr-401
413-IleAlaArgAlaAlaGlu-418
431-PheIleLysArgGlyThrLeuValAsnSerTyrAlaLys-443

Hydrophilic Regions - Hopp-Woods
21-GluValValAspGluSerAsnGlyLysAlaLeuAlaGluHisAlaArg-36
42-IleAspLeuGluAspMetGlyMetThr-50
65-TyrAlaGlyArgLeuLysLysLeuLeuAspAlaLeuGluGlnProGly-80
104-HisGluAlaAspTyr-108
117-ThrPheArgGluAlaAlaGluAlaGln-125
146-AspThrTyrArgGluAlaAla-152
189-ArgLeuPheAspLeuAspLys-195
197-AlaPheProAspArgGlyGly-203
226-ThrGlyIleArgArgGluAlaGlyLeu-234
246-ProArgGlnArgPheAspGly-252
256-ValAlaAspArgAlaAlaAla-262
276-LeuGlnAsnArgLeuAsnArgLeuThrAla-285
313-AlaHisGlyGluGluMetThrAla-320
322-AspLeuIleGluValAsnArgAlaMetArgArgArgMetGlnAla-336
348-AlaAlaGluSerGlyGly-353
368-GluSerLeuArgAlaAlaAla-374
413-IleAlaArgAlaAlaGlu-418
721
AMPHI Regions - AMPHI
87-AlaGlyTrpMetArgTrpLeuGlu-94
120-ArgTyrIleSerAlaVal-125
135-SerLysIlePheHisAlaAlaLeuThrAsnPheProAlaLeuAspGlyMetAspGluValLeuAla-156
170-AsnProMetLysGluLeuLeuGlnGlnLeuPheAspLeuPro-183
210-AspValPheAlaGln-214
236-LysTyrAlaProIleSerValValGlnGluLeuGln-247
282-TrpAlaLysGlyValLeuLysGlnProGlyGly-292
294-AlaPheLeuThrGlyPheIleGlu-301

Antigenic Index - Jameson-Wolf
1-MetSerLysAsnAlaGln-6
16-GluValGlnProLysAspGlyArgIle-24
27-LeuProTyrGlyGlu-31
33-ArgAlaValAspGlyArgProThrAspValProAla-44

48-ThrGluGluAsnGlyHisAsp-54
58-LeuAlaAsnSerSerArgAsnGlnLeu-66
74-ThrLeuTyrLysGluLysAsnGlyGlnProAlaPro-85
94-GluPheThrProLysGlyMetPheAla-102
105-GluTrpThrAspLysAlaAla-111
115-AlaAlaLysGluTyrArg-120
126-PheSerTyrAspThrLysGlyTyrVal-134
149-AspGlyMetAspGluValLeu-155
161-GlnIleLeuLysProGluThrGluGlnAsnProMetLysGluLeuLeu-176
183-ProAspAlaGlyGluGluGluLeuLysAla-192
198-ValGluAlaLysProLysAspValAlaLeu-207
215-LeuAlaGluLysAspSerArgIle-222
228-GlnThrAlaLysProAspLeuThrLysTyrAla-238
255-AlaLysGlnGluAlaAspLysGlyAsnGlu-264
277-ProAlaGlnLysGluTrpAla-283
286-ValLeuLysGlnProGlyGly-292
311-GlySerGlnThrGlyGlyLysAlaProAspGluArgValAla-324
327-ThrAlaGluGluAlaAlaAla-333
338-GlyMetSerGlyGluGluPheValLysIleLysGluSerGluGlyLys-353

Hydrophilic Regions - Hopp-Woods
1-MetSerLysAsnAlaGln-6
17-ValGlnProLysAspGlyArgIle-24
33-ArgAlaValAspGlyArgProThrAsp-41
49-GluGluAsnGlyHis-53
74-ThrLeuTyrLysGluLysAsnGlyGln-82
105-GluTrpThrAspLysAlaAla-111
115-AlaAlaLysGluTyrArg-120
149-AspGlyMetAspGluValLeu-155
163-LeuLysProGluThrGluGlnAsnProMetLysGluLeuLeu-176
183-ProAspAlaGlyGluGluGluLeuLysAla-192
198-ValGluAlaLysProLysAspValAlaLeu-207
215-LeuAlaGluLysAspSerArgIle-222
229-ThrAlaLysProAspLeuThrLys-236
255-AlaLysGlnGluAlaAspLysGlyAsnGlu-264
277-ProAlaGlnLysGluTrpAla-283
314-ThrGlyGlyLysAlaProAspGluArgValAla-324
327-ThrAlaGluGluAlaAlaAla-333
340-SerGlyGluGluPheValLysIleLysGluSerGluGlyLys-353
723
AMPHI Regions - AMPHI
57-ThrGlnGlnValGluHisValAspPheValAlaValAla-69
87-AsnValAlaAlaLys-91
123-CysAspLeuAlaVal-127
135-ValGlyGluLeuGlnAspPhe-141
208-SerIleThrSerArg-212
245-LysAlaValValSerIle-250

Antigenic Index - Jameson-Wolf
1-MetArgProLysProArgPheArgArgSerVal-11
55-HisSerThrGlnGln-59
76-HisAlaLeuSerArgArgGlnThrVal-84
92-AlaHisGlnAspGlyArgGlnIleLeuLysArgSerSerGluProProGlnIleArgValAspPheGlySerG
lyValHisGlnArgGlyLeuCys-123
142-GlnLeuThrGluThrArgAsnHisIleLeuAsnArgArgValCysHis-157

164-CysSerIleGlySer-168
177-SerProThrSerAlaArgPheThrSerArgGlnProProSerAsnSerArgProProArgGlnAsnSerLeu
Pro-201
213-LeuSerAlaLysAlaSerAla-219
229-SerAlaSerSerAlaAspSer-235
260-SerAlaCysThrAlaSerAsn-266
269-LeuMetSerSerAsnAspGlyAlaAla-277
294-CysPheArgArgArgArgIleArgIle-302

Hydrophilic Regions - Hopp-Woods
1-MetArgProLysProArgPheArgArgSerVal-11
77-AlaLeuSerArgArgGlnThrVal-84
92-AlaHisGlnAspGlyArgGlnIleLeuLysArgSerSerGluProProGlnIleArgValAspPhe-113
142-GlnLeuThrGluThrArgAsn-148
150-IleLeuAsnArgArgValCys-156
183-PheThrSerArgGlnProProSerAsnSerArgProProArgGlnAsnSer-199
213-LeuSerAlaLysAlaSerAla-219
271-SerSerAsnAspGlyAlaAla-277
294-CysPheArgArgArgArgIleArgIle-302
724
AMPHI Regions - AMPHI
6-LeuAlaLysLysThr-10
12-GlnThrAlaLysAsnIleGlyGluThrLeuArg-22
40-ArgValGlnLeuSer-44
47-AlaAspGluThrLeuGlnAspLeuGluHisLeuGlnGlu-59

Antigenic Index - Jameson-Wolf
5-LysLeuAlaLysLysThrAlaGlnThrAlaLysAsnIleGlyGluThrLeuArgAlaAlaPheArgGlyLysIl
e-29
34-SerSerGluProIleGlnArgValGlnLeuSerGlyLeuAlaAspGluThrLeuGlnAspLeuGluHis-56
60-TyrGlyPheAlaSerHisProProAspGlySerGluAla-72
77-LeuGlyGlyAsnThrSer-82
90-GlnHisGlySerTyrArgIleLysAsnLeuLysProGlyGluThr-104
108-AsnHisGluGlyAlaLysIleValIleLysGlnGlyLysIleIleGluAlaAspCysAspVal-128
130-ArgValAsnCysLysGlnTyrGlu-137
142-ThrAspAlaLysPhe-146
162-GlnIleAsnGlyAsnGly-167
170-AlaValGluGlyGlyAspGlyAlaThrPheSerGlyAspValAsnGlnThrGlyGlySerPheAsnThrAsp
GlyAspValValAla-198
205-GlnHisProHisThrAspSerIleGlyGlyLysThrLeuProAlaGluProAla-222

Hydrophilic Regions - Hopp-Woods
5-LysLeuAlaLysLysThrAlaGlnThrAlaLysAsnIleGlyGluThrLeuArgAlaAlaPheArgGly-27
46-LeuAlaAspGluThrLeuGlnAspLeuGluHis-56
66-ProProAspGlySerGlu-71
94-TyrArgIleLysAsnLeuLysProGlyGlu-103
110-GluGlyAlaLysIleValIleLysGlnGlyLysIleIleGluAlaAspCysAspVal-128
132-AsnCysLysGlnTyrGlu-137
142-ThrAspAlaLysPhe-146
190PheAsnThrAspGlyAspVal-196
205-GlnHisProHisThrAspSerIleGly-213
725
AMPHI Regions - AMPHI
11-GluAlaAspAspLeuAlaGlyGlnIleHisThrLeuProAlaValTrp-26
41-GlyValCysGlyArgTyrGlnAsp-48

81-AspLeuIleArgAlaValArgArgLeuLeuAsp-91
104-ValProLysAlaValArgAlaIle-111
144-ProGluArgThrAspAsnProAsp-151
155-HisIlePheThrLysTyrGlnGlyThrLeuSerGluProTrpProAspPheGlu-172
180-AspProGlnSerAla-184

Antigenic Index - Jameson-Wolf
3-ArgThrValLysSerTyrAsnGlyGluAlaAspAspLeuAla-16
29-TyrGlyGlySerLysValGluProAlaSerThrGlyGlyValCysGlyArgTyrGlnAspThrAla-50
59-ArgAsnLeuArgAsnGluGlnAlaGlnArgGlnGlyGlyIleAspSerArgGluIleGlySerAsnAspLeuI
leArgAlaValArgArgLeuLeuAspGlyGlnArgLeuGlyPheAlaAspSerArgGlyLeuValProLysAlaVa
lArg-109
134-AsnThrCysGlyLeuGluAsnAspArgTyrProGluArgThrAspAsnProAspAspProAsn-154
160-TyrGlnGlyThrLeuSerGluProTrpProAspPheGluGlyLeuAspGlyLysIleTyrAspProGlnSer
AlaAspGluIlePro-188
192-ThrLeuLysAspLysGln-197

Hydrophilic Regions - Hopp-Woods
8-TyrAsnGlyGluAlaAspAspLeuAla-16
32-SerLysValGluProAlaSer-38
45-ArgTyrGlnAspThrAla-50
59-ArgAsnLeuArgAsnGluGlnAlaGlnArgGlnGlyGlyIleAspSerArgGluIleGlySer-79
81-AspLeuIleArgAlaValArgArgLeuLeuAspGlyGlnArg-94
96-GlyPheAlaAspSerArgGlyLeuVal-104
137-GlyLeuGluAsnAspArgTyrProGluArgThrAspAsnProAspAspProAsn-154
172-GluGlyLeuAspGlyLysIleTyrAsp-180
182-GlnSerAlaAspGluIlePro-188
192-ThrLeuLysAspLysGln-197
726
AMPHI Regions - AMPHI
12-AspThrLeuGlyGlyIleProGlu-19
55-ProArgProSerAspTyrHisGlu-62
74-AlaAlaAlaAlaArg-78
110-IleAspSerPheTyrArg-115
122-AlaArgGlnAlaAsp-126
137-IleAlaAlaAlaArg-141
180-IleGluThrAlaProGlyLeuAspAlaLeuGluLysGluIleGlu-194

Antigenic Index - Jameson-Wolf
5-PheLysAsnGlyPheTyrAspAspThrLeuGlyGlyIleProGluGly-20
24-ValArgAlaGluGluTyr-29
37-AlaGlnGlyGlyGlnIleAlaAlaAspSerAspGlyArgProValLeuThrProProArgProSerAspTyrH
isGluTrpAspGlyLysLysTrpLysIleSerLys-72
78-ArgPheAlaLysGlnLysThr-84
90-LeuAlaGluLysAlaAspGluLeuLysAsnSer-100
106-ProGlnValGluIleAspSerPheTyrArgGlnGluLysGluAlaLeuAlaArgGlnAlaAspAsnAsnAla
ProThr-131
151-LysValIleGluLysSerAlaArg-158
167-IleGlyLysArgGlnGlnLeuGluAspLysLeuAsnThr-179
181-GluThrAlaProGlyLeuAspAlaLeuGluLysGluIleGluGlu-195

Hydrophilic Regions - Hopp-Woods
24-ValArgAlaGluGluTyr-29
42-IleAlaAlaAspSerAspGlyArgPro-50
55-ProArgProSerAspTyrHisGluTrpAspGlyLysLysTrpLysIleSerLys-72

78-ArgPheAlaLysGlnLysThr-84
90-LeuAlaGluLysAlaAspGluLeuLysAsn-99
114-TyrArgGlnGluLysGluAlaLeuAlaArgGlnAlaAspAsnAsnAla-129
151-LysValIleGluLysSerAlaArg-158
167-IleGlyLysArgGlnGlnLeuGluAspLysLeuAsnThr-179
187-AspAlaLeuGluLysGluIleGluGlu-195
727
AMPHI Regions - AMPHI
6-LeuLeuAlaAsnAsn-10
12-GlnProIleAlaIleIleAla-18

Antigenic Index - Jameson-Wolf
28-HisHisGlnGlyTyrLysSerAlaPheAlaLysGln-39
41-AlaValIleAspLysMetGluArgAspLysAlaGln-52
60-AsnTyrAlaArgGluLeuGluLeuAlaArgAlaGluAlaLysLysTyrGluValLysAla-79
86-LeuAlaLysLysGlnAlaGluValSerArgLeuLysThrGluArgAspLeuCysLys-104
106-ProPheProProAspSerArgAsnProAsnThrGlyPhe-118
122-SerProGlnIleProProAsnPhe-129

Hydrophilic Regions - Hopp-Woods
41-AlaValIleAspLysMetGluArgAspLysAlaGln-52
60-AsnTyrAlaArgGluLeuGluLeuAlaArgAlaGluAlaLysLysTyrGluValLysAla-79
86-LeuAlaLysLysGlnAlaGluValSerArgLeuLysThrGluArgAspLeuCys-103
109-ProAspSerArgAsnProAsnThr-116
728
AMPHI Regions - AMPHI
11-SerPhePheAlaLeuValPheAla-18
39-AlaThrGluValProLysAsnPro-46
48-AlaPheValAlaLysLeuAlaArgLeuPheArgAsnAla-60
76-AsnLeuAlaGlyThrValAspAsp-83
198-GluAspValTyrGluHisCysLeuGlyCysTyrGlnMet-210
218-TyrArgAspValAlaAsnAspGlu-225
235-SerAsnArgIleAlaSer-240
249-GlnAsnMetArgGluLeuMetProArg-257
355-GluLysGluValArgArgTyrAlaGluAlaAlaAlaArg-367

Antigenic Index - Jameson-Wolf
29-IleAsnProArgTrp-33
35-LeuSerAspThrAlaThrGluValProLysAsnProAsn-47
57-PheArgAsnAlaAspArgAla-63
69-GluSerIleArgThrGluGluAsnLeuAlaGlyThrValAspAspGlyProLeuGlnSerGluLysAspTyr-92
98-ArgLeuSerArgLeuLysGluLysAlaLys-107
112-ThrGluGlnGluHisGlyLys-118
125-HisIleGlyGluGlyGly-130
136-LeuSerGlnArgSerProGluAlaPheVal-145
149-TyrLeuTyrArgAsnAspArgProPheSer-158
166-ValHisGlyGluAsnTyrGluThrThrGlyGluTyrArgVal-179
182-GlnProAspGlySerVal-187
190-AlaAlaGlyArgGlyLysIleGlyGluAspValTyr-201
217-LysTyrArgAspValAlaAsnAspGluGlnLysValTrpAspPheArgLysGluSerAsnArgIleAlaSer
AspSerArgAsnSerValPheTyrGlnAsnMetArgGluLeuMetProArgGlyMetLysAlaAsnSer-263
267-GlyTyrAspAlaAspGlyLeuProGlnLys-276
280-SerPheAspAsnGlyLysLysArgGlnSerPheGluTyrTyrLeuLysAsnGlyAsn-298
309-LeuLysAlaAspGlyValThr-315

329-LeuAspGlyGlyArgIleValArgGluGluLysGlnGlyAspArgLeuProAspPhe-347
352-GluAsnLeuGluLysGluValArgArgTyrAlaGluAlaAlaAlaArgArgSerGlyGlyArgArgAspLeu
SerHis-377

Hydrophilic Regions - Hopp-Woods
38-ThrAlaThrGluValProLysAsnPro-46
57-PheArgAsnAlaAspArgAla-63
69-GluSerIleArgThrGluGluAsnLeu-77
80-ThrValAspAspGlyProLeuGlnSerGluLysAspTyr-92
98-ArgLeuSerArgLeuLysGluLysAlaLys-107
112-ThrGluGlnGluHisGlyLys-118
136-LeuSerGlnArgSerProGlu-142
151-TyrArgAsnAspArgProPhe-157
169-GluAsnTyrGluThrThrGlyGluTyr-177
190-AlaAlaGlyArgGlyLysIleGlyGluAspValTyr-201
217-LysTyrArgAspValAlaAsnAspGluGlnLysValTrpAspPheArgLysGluSerAsnArgIleAlaSer
AspSerArgAsn-244
250-AsnMetArgGluLeuMetProArgGlyMetLys-260
268-TyrAspAlaAspGlyLeuPro-274
282-AspAsnGlyLysLysArgGlnSer-289
309-LeuLysAlaAspGlyValThr-315
331-GlyGlyArgIleValArgGluGluLysGlnGlyAspArgLeuPro-345
352-GluAsnLeuGluLysGluValArgArgTyrAlaGluAlaAlaAlaArgArgSerGlyGlyArgArgAspLeu
SerHis-377
729
AMPHI Regions - AMPHI
21-CysThrMetIleProGlnTyr-27
33-GluValAlaGluThrPheLysAsnAspThr-42
55-HisAspTyrPheAla-59
61-ProArgLeuGlnLysLeuIleAspIle-69
149-GlnGlyTyrPheAla-153
164-SerLeuIleAlaThrValAlaLys-171
242-LeuAlaThrLeuIleAsn-247
268-LysLeuProAlaGlyLeu-273
322-LeuGlyGlyLeuPheLysSerGly-329
371-ValGlnSerAlaPheGlnAspValAlaAsnAla-381
388-LeuAspLysAlaTyrAspAlaLeuSerLysGlnSerArg-400
419-GlyAlaLeuAspLeuLeuAspAla-426
442-LeuThrArgAlaGluAsnLeuAlaAspLeuTyrLysAlaLeuGlyGlyGlyLeuLys-460

Antigenic Index - Jameson-Wolf
25-ProGlnTyrGluGlnProLysValGluVal-34
36-GluThrPheLysAsnAspThrAlaAspSerGlyIleArgAlaValAsp-51
53-GlyTrpHisAspTyrPheAlaAspProArgLeuGlnLys-65
70-AlaLeuGluArgAsnThrSerLeuArgThr-79
85-GluIleTyrArgLysGlnTyrMetIleGluArgAsnAsnLeuLeuPro-100
105-AsnAlaAsnAspSerArgGlnGlySerLeuSerGlyGlyAsnValSerSerSerTyrLysVal-125
138-GlyArgValArgSerSerSerGluAlaAla-147
155-ThrAlaAsnArgAspAlaAla-161
173-TyrPheAsnGluArgTyrAlaGluGluAlaMet-183
188-ArgValLeuLysThrArgGluGluThrTyrLysLeuSerGluLeuArgTyr-204
215-ArgGlnGlnGluAlaLeuIleGluSerAlaLysAlaAspTyr-228
232-AlaArgSerArgGluGlnAlaArgAsn-240
248-GlnProIleProGluAspLeuProAla-256
277-ValLeuLeuAspArgProAspIleArgAlaAlaGluHisAlaLeuLysGlnAlaAsnAla-296

315-ValGlyThrGlySerAlaGluLeu-322
325-LeuPheLysSerGlyThr-330
347-GlyThrAsnLysAlaAsnLeuAspValAlaLysLeuArgGlnGln-361
383-AlaAlaArgGluGlnLeuAspLysAlaTyrAspAlaLeuSerLysGlnSerArgAlaSerLysGluAlaLeu
Arg-407
411-LeuArgTyrLysHisGlyValSer-418
424-LeuAspAlaGluArgSerSerTyrAla-432
442-LeuThrArgAlaGluAsnLeu-448
455-LeuGlyGlyGlyLeuLysArgAspThrGlnThrAspLys-467

Hydrophilic Regions - Hopp-Woods
28-GluGlnProLysValGluVal-34
36-GluThrPheLysAsnAspThrAlaAspSerGlyIleArgAlaVal-50
61-ProArgLeuGlnLys-65
70-AlaLeuGluArgAsnThrSerLeu-77
91-TyrMetIleGluArgAsnAsn-97
105-AsnAlaAsnAspSerArgGlnGlySer-113
138-GlyArgValArgSerSerSerGluAlaAla-147
156-AlaAsnArgAspAlaAla-161
177-ArgTyrAlaGluGluAlaMet-183
188-ArgValLeuLysThrArgGluGluThrTyrLysLeuSerGluLeuArgTyr-204
215-ArgGlnGlnGluAlaLeuIleGluSerAlaLysAlaAspTyr-228
232-AlaArgSerArgGluGlnAlaArgAsn-240
250-IleProGluAspLeuPro-255
277-ValLeuLeuAspArgProAspIleArgAlaAlaGluHisAlaLeuLysGlnAlaAsn-295
350-LysAlaAsnLeuAspValAlaLysLeuArgGln-360
383-AlaAlaArgGluGlnLeuAspLysAlaTyrAspAlaLeuSerLysGlnSerArgAlaSerLysGluAlaLeu
Arg-407
424-LeuAspAlaGluArgSerSerTyrAla-432
442-LeuThrArgAlaGluAsnLeu-448
458-GlyLeuLysArgAspThrGlnThrAspLys-467
730
AMPHI Regions - AMPHI
6-ArgLeuThrAsnLeuLeuAlaAlaCys-14
26-LeuAlaAlaAspLeu-30
67-LysIleAsnValIleGlnAspTyrThrHisGln-77
111-AsnHisAlaAlaAsp-115
141-HisProAlaAspAlaTyrAspGlyProLysGlyGlyAsnTyrProLysProThr-158
187-GlnArgIleSerAspAsnTyrSerAsnLeuGlySerAsnPheSerAspArgAlaAspGlu-206
214-HisAsnAlaLysLeu-218
220-ArgTrpGlyAsnSerMetGluPheIleAsnGlyValAla-232
234-GlyAlaLeuAsnProPheIleSer-241
262-AlaAlaMetArgAsnIleAla-268
277-AlaValIleGlyGlyLeuGlySerValAlaGlyPheGluLysAsnThrArgGluAlaValAspArgTrpIle
GlnGlu-302
305-AsnAlaAlaGluThrValGluAlaValPheAsnValAlaAlaAlaAlaLysValAlaLysLeuAlaLysAla
AlaLysPro-331
338-GlyAspPheAlaAspSerTyr-344
387-AsnGlyArgGluIleAspAlaVal-394
405-ThrIleSerAlaIleAspLysProLys-413

Antigenic Index - Jameson-Wolf
2-LysProLeuArgArgLeuThr-8
35-PheIleThrAspAsnAlaGlnArgGlnHisTyrGluProGlyGlyLys-50
55-GlyAspProArgGlySerValSerAspArgThrGlyLysIleAsnVal-70

97-ArgPheSerGlyHisGlyHisGluGluHisAlaProPheAsp-110
112-HisAlaAlaAspSerAlaSerGluGluLysGlyAsnValAspGluGlyPhe-128
134-AsnTrpGluGlyHisGluHisHisProAlaAspAlaTyrAspGlyProLysGlyGlyAsnTyrProLysPro
ThrGlyAlaArgAspGluTyrThr-165
167-HisValAsnGlyThrAlaArgSerIleLysLeuAsnProThrAspThrArgSerIleArgGlnArgIleSer
AspAsnTyrSerAsn-195
197-GlySerAsnPheSerAspArgAlaAspGluAlaAsnArgLysMetPheGluHisAsnAlaLysLeuAspArg
TrpGlyAsnSer-224
257-TyrAlaIleAspLysAlaAlaMet-264
271-ProAlaGluGlyLys-275
287-GlyPheGluLysAsnThrArgGluAlaValAsp-297
299-TrpIleGlnGluAsnProAsnAlaAlaGluThrVal-310
321-LysValAlaLysLeuAlaLysAlaAlaLysProGlyLysAlaAlaValSerGlyAspPheAlaAspSerTyr
LysLysLysLeuAlaLeuSerAspSerAlaArgGln-356
359-GlnAsnAlaLysTyrArgGluAlaLeu-367
373-AspLeuIleArgArgLysThrAspGlySerSerLysPheIleAsnGlyArgGluIleAspAlaValThrAsn
Asp-397
400-IleGlnAlaLysArgThrIleSerAlaIleAspLysProLysAsnPheLeuAsnGlnLysAsnArgLysGln
IleLysAlaThrIle-428
430-AlaAlaAsnGlnGlnGlyLysArgAlaGluPhe-440
452-SerTyrIleGluSerLysGlyGlyIleValLysThrGlyLeuGlyAsp-467

Hydrophilic Regions - Hopp-Woods
2-LysProLeuArgArgLeuThr-8
39-AsnAlaGlnArgGlnHisTyrGluProGlyGly-49
55-GlyAspProArgGlySerValSerAspArgThrGlyLys-67
102-GlyHisGluGluHisAlaPro-108
112-HisAlaAlaAspSerAlaSerGluGluLysGlyAsnValAspGluGly-127
135-TrpGluGlyHisGluHisHisPro-142
144-AspAlaTyrAspGlyProLysGlyGlyAsnTyrProLys-156
158-ThrGlyAlaArgAspGluTyr-164
170-GlyThrAlaArgSerIleLys-176
178-AsnProThrAspThrArgSerIleArgGlnArgIleSerAsp-191
200-PheSerAspArgAlaAspGluAlaAsnArgLysMetPheGluHisAsnAlaLysLeuAspArgTrpGlyAsn
-223
257-TyrAlaIleAspLysAlaAlaMet-264
271-ProAlaGluGlyLys-275
287-GlyPheGluLysAsnThrArgGluAlaValAsp-297
303-AsnProAsnAlaAlaGluThrVal-310
321-LysValAlaLysLeuAlaLysAlaAlaLysProGlyLysAlaAlaVal-336
339-AspPheAlaAspSerTyrLysLysLysLeuAlaLeu-350
361-AlaLysTyrArgGluAlaLeu-367
373-AspLeuIleArgArgLysThrAspGlySerSer-383
386-IleAsnGlyArgGluIleAspAlaValThr-395
400-IleGlnAlaLysArgThrIleSerAlaIleAspLysProLysAsn-414
418-GlnLysAsnArgLysGlnIleLysAlaThrIle-428
430-AlaAlaAsnGlnGlnGlyLysArgAlaGluPhe-440
452-SerTyrIleGluSerLysGlyGlyIle-460
731
AMPHI Regions - AMPHI
17-AlaCysAlaValPro-21

Antigenic Index - Jameson-Wolf
22-GluAlaTyrAspAspGlyGlyArgGlyHis-31
34-ProValGlnAsnGlnAlaGlyThrAspAspPheArg-45

48-SerCysGluAsnGlyLeu-53
55-ValArgValArgHisLeuAspSerGlyLysValAlaLeuArgLeuAspGlyArgArgAlaValLeuSerSerA
spValAlaAlaSerGlyGluArgTyrThrAla-89
98-ThrGluTrpHisGlnLysGlyGlyGluAla-107
113-AspAlaTyrGlyAsnSerValGluThrSerCysArgAlaArg-126

Hydrophilic Regions - Hopp-Woods
22-GluAlaTyrAspAspGlyGlyArgGlyHis-31
39-AlaGlyThrAspAspPheArg-45
55-ValArgValArgHisLeuAspSerGlyLysValAlaLeuArgLeuAspGlyArgArgAlaValLeu-76
80-ValAlaAlaSerGlyGluArgTyrThrAla-89
100-TrpHisGlnLysGlyGlyGlu-106
119-ValGluThrSerCysArgAlaArg-126
732
AMPHI Regions - AMPHI
14-LeuGlyAlaIleSer-18
43-ValGlnSerIleArgThrMetAlaGluValTyrGly-54
66-AspAlaAspLeuPheGluGlyAlaMetLysGlyMetVal-78
95-GluIleLysGluSerThrSerGly-102
115-AspGlyPheValLysValValSerProIleGluAsp-126
155-GluAlaValLysLysMet-160
183-ValAsnLeuThrArg-187
214-GluArgThrValGluSerValAsnThrAlaAlaLys-225
283-LysAlaIleProGluAsp-288
297-SerLeuAlaGlyIleProAlaGluLeu-305
322-SerGluIleValAlaGly-327
400-LeuValGlyHisIleGlyAsn-406
446-ArgArgIleProAsnProAlaLysAsp-454
459-LysAlaLeuAspLeuValLysSerProGluGlnTrpGlnLysSerLeu-474

Antigenic Index - Jameson-Wolf
30-AlaAlaGluLysAspArgArgAspAsnGluVal-40
59-AsnTyrTyrGlnAspLysProAspAlaAspLeuPhe-70
82-AspProHisSerGluTyrMetAspLysLysGlyTyrAlaGluIleLysGluSerThrSerGlyGluPheGlyG
ly-106
111-IleGlyGlnGluAspGlyPhe-117
122-SerProIleGluAspThrProAlaGluArgAlaGlyValLysSerGlyAspPhe-139
144-AspAsnValSerThrArgGlyMetThr-152
155-GluAlaValLysLysMetArgGlyLysProGlyThrLysIle-168
172-LeuSerArgLysAsnAlaAspLysProIle-181
199-LeuIleGluProAspTyrGlyTyr-206
211-GlnPheGlnGluArgThrValGlu-218
221-AsnThrAlaAlaLysGluLeuValLysGluAsnLysGlyLysProLeuLys-237
242-AspLeuArgAspAspProGlyGlyLeu-250
269-ValSerThrLysGlyArgAspGlyLysAspArgMetVal-281
284-AlaIleProGluAspTyr-289
292-GlyMetGlyGlyAspSer-297
303-AlaGluLeuLysThr-307
316-SerGlySerAlaSerAla-321
330-GlnAspHisLysArgAlaVal-336
340-ThrGlnSerPheGlyLysGlySerVal-348
354-LeuSerAsnGlySer-358
368-TyrThrProAsnAspArgSerIleGln-376
384-ValGluValLysAspLysGluArgIlePheGluSerArgGluAlaAspLeu-400
405-GlyAsnProLeuGlyGlyGluAspValAsnGly-415

421-ProLeuGluLysAspAlaAspLysProAlaValLysGluLysGlyLysLysLysLysAspGluAspLeuSer
SerArgArgIleProAsnProAlaLysAspAspGlnLeuArgLysAlaLeuAspLeuValLysSerProGluGlnT
rpGlnLys-472
477-AlaAlaLysLysProValSerAsnLysAspLysLysAspLysLysAspLysLys-494

Hydrophilic Regions - Hopp-Woods
30-AlaAlaGluLysAspArgArgAspAsnGluVal-40
60-TyrTyrGlnAspLysProAspAlaAspLeuPhe-70
82-AspProHisSerGluTyrMetAspLysLysGlyTyrAlaGluIleLysGluSerThrSerGlyGlu-103
111-IleGlyGlnGluAspGlyPhe-117
122-SerProIleGluAspThrProAlaGluArgAlaGlyValLysSerGlyAspPhe-139
144-AspAsnValSerThr-148
155-GluAlaValLysLysMetArgGlyLysProGlyThr-166
172-LeuSerArgLysAsnAlaAspLysProIle-181
211-GlnPheGlnGluArgThrValGlu-218
221-AsnThrAlaAlaLysGluLeuValLysGluAsnLysGlyLysProLeuLys-237
242-AspLeuArgAspAspProGly-248
271-ThrLysGlyArgAspGlyLysAspArgMetVal-281
303-AlaGluLeuLysThr-307
330-GlnAspHisLysArgAlaVal-336
370-ProAsnAspArgSerIleGln-376
384-ValGluValLysAspLysGluArgIlePheGluSerArgGluAlaAspLeu-400
408-LeuGlyGlyGluAspValAsnGly-415
421-ProLeuGluLysAspAlaAspLysProAlaValLysGluLysGlyLysLysLysAspGluAspLeuSer
SerArgArgIleProAsnProAlaLysAspAspGlnLeuArgLysAlaLeuAspLeuValLysSerProGluGlnT
rpGln-471
477-AlaAlaLysLysProValSerAsnLysAspLysLysAspLysLysAspLysLys-494
733
AMPHI Regions - AMPHI
6-ThrLeuSerArgLeuSer-11
33-TyrGlyGlyTyrProAspThrValTyrGluGly-43
53-LysGlnThrGluLysMetGluLysTyrPheVal-63
92-GlyAlaPheArgGlnPheGluGlu-99

Antigenic Index - Jameson-Wolf
2-MetAsnProLysThrLeuSer-8
22-CysGlyGlyAsnGlyGlnLysSer-29
33-TyrGlyGlyTyrProAspThrValTyrGluGlyLeuLysAsnAspAspThrSerLeuGlyLysGlnThrGluL
ysMetGluLysTyrPhe-62
65-AlaGlyAsnLysLysMetAsnAlaAlaProGlyAla-76
84-LeuSerArgSerGlyAspLysGluGlyAlaPheArgGlnPheGluGluGluLysArgLeuPheProGlu-106
115-MetLysThrGlyLysGlyGlyLysArg-123

Hydrophilic Regions - Hopp-Woods
40-ValTyrGluGlyLeuLysAsnAspAspThrSerLeuGlyLysGlnThrGluLysMetGluLysTyrPhe-62
65-AlaGlyAsnLysLysMetAsnAla-72
86-ArgSerGlyAspLysGluGlyAlaPheArgGlnPheGluGluGluLysArgLeuPhePro-105
115-MetLysThrGlyLysGlyGlyLysArg-123
734-2
AMPHI Regions - AMPHI
19-ArgAlaAlaAspThrTyr-24
26-TyrLeuAlaValTrpGlnAsnProGlnAsnAlaAsp-37
53-GluAlaPheSerGluLeuGluAlaPheCysLys-63
77-ThrGlyCysArgSerValValSer-84
92-LeuAlaTyrProLysAlaLeuGlyAlaLeuArg-102

113-ArgPheThrSerVal-117
121-AlaLeuAsnGlnCysIleLys-127

Antigenic Index - Jameson-Wolf
18-AlaArgAlaAlaAsp-22
31-GlnAsnProGlnAsnAlaAspAspValLeuGln-41
43-LysThrThrLysGluAspSerThrLysSerGluAlaPheSerGlu-57
59-GluAlaPheCysLysGlyGlnAspThr-67
71-IleAlaGluAspGluProThrGlyCysArgSer-81
101-LeuArgValAspAsn-105
111-SerProArgPheThrSer-116
125-CysIleLysLysTyrGlyVal-131
145-SerSerTyrTyrGly-149

Hydrophilic Regions - Hopp-Woods
18-AlaArgAlaAlaAsp-22
34-GlnAsnAlaAspAspValLeuGln-41
43-LysThrThrLysGluAspSerThrLysSerGluAlaPheSerGlu-57
59-GluAlaPheCysLysGlyGlnAspThr-67
71-IleAlaGluAspGluProThrGlyCys-79
101-LeuArgValAspAsn-105
735
AMPHI Regions - AMPHI
6-LeuLeuAlaAsnAsn-10
12-GlnProIleAlaIleIleAla-18
118-GlyCysIleAspGlyPheGly-124

Antigenic Index - Jameson-Wolf
28-HisHisGlnGlyTyrLysSerAlaPheAlaLysGln-39
41-AlaValIleAspLysMetGluArgAspLysAlaGln-52
60-AsnTyrAlaArgGluLeuGluLeuAlaArgAlaGluAlaLysLysTyrGluValLysAla-79
86-LeuAlaLysLysGlnAlaGluValSerArgLeuLysThrGluAsnLysLysGluIleGluAsn-106
108-LeuThrGlnAspArgLysAsnAlaSerGlyGlyCysIleAspGlyPheGlySerHisGly-127
134-AlaLeuGlyTyrGlyAsn-139

Hydrophilic Regions - Hopp-Woods
41-AlaValIleAspLysMetGluArgAspLysAlaGln-52
60-AsnTyrAlaArgGluLeuGluLeuAlaArgAlaGluAlaLysLysTyrGluValLysAla-79
86-LeuAlaLysLysGlnAlaGluValSerArgLeuLysThrGluAsnLysLysGluIleGluAsn-106
108-LeuThrGlnAspArgLysAsnAlaSer-116
736
AMPHI Regions - AMPHI
13-GlyLeuIleGlnSerLeuGlySer-20
50-GlyValLeuSerVal-54
61-GlyLeuPheValGly-65
70-LeuGlnGlyTyrThrGlnLeuSerLysPheLysSerAlaAspIle-84
93-LeuLeuArgGluLeuGlyProVal-100
120-LeuMetLysThrThrGluGlnLeuGluAlaMetAsnValMet-133
135-ValAsnProValAlaArgValVal-142
144-ProArgPheTrpAlaGlyValPheSerMetPro-154
156-LeuAlaSerIlePheAsnValAlaGlyIlePheGlyAla-168
196-AspValIleAsnGlyLeu-201
230-LeuArgAlaSerThrArgThr-236

Antigenic Index - Jameson-Wolf

37-ValArgProArgLeuSerVal-43
77-SerLysPheLysSer-81
93-LeuLeuArgGluLeuGly-98
109-SerAlaGlyGlyAlaMetThrSer-116
122-LysThrThrGluGlnLeuGlu-128
186-GlnMetGlnAsnAsn-190
224-ProThrSerGluGlyIleLeuArgAlaSerThr-234

Hydrophilic Regions - Hopp-Woods
39-ProArgLeuSerVal-43
77-SerLysPheLysSer-81
93-LeuLeuArgGluLeuGly-98
122-LysThrThrGluGlnLeuGlu-128
737
AMPHI Regions - AMPHI
56-AlaAlaLeuAlaArgValGlyGly-63

Antigenic Index - Jameson-Wolf
24-AlaHisHisAspGlyHisGlyAspAspAspHisGlyHis-36
38-AlaHisGlnHisAsnLysGlnAspLysIleIleSer-49
51-AlaGlnAlaGluLysAlaAlaLeu-58
60-ArgValGlyGlyLysIleThrAspIleAspLeuGluHisAspAsnGlyArgProHisTyrAspValGluIleV
alLysAsnGlyGlnGluTyr-90
94-ValAspAlaArgThrGlyArgValIleSerSerArgArgAspAsp-108

Hydrophilic Regions - Hopp-Woods
27-AspGlyHisGlyAspAspAspHisGlyHis-36
40-GlnHisAsnLysGlnAspLysIleIleSer-49
51-AlaGlnAlaGluLysAlaAlaLeu-58
61-ValGlyGlyLysIleThrAspIleAspLeuGluHisAspAsnGlyArgProHisTyr-79
82-GluIleValLysAsnGlyGlnGluTyr-90
94-ValAspAlaArgThrGlyArg-100
102-IleSerSerArgArgAspAsp-108
738
AMPHI Regions - AMPHI
91-LeuMetAsnLeuIleTyrProGlyMetAsnAsp-101
139-IleGlySerLeuLeuGlnSerCysIle-147
228-ThrTyrIleAlaAlaIleAlaLeuIle-236
271-ThrIleLeuGluThrPheThrGlyIle-279
285-ValGluArgValAlaAsnGlyGlyPheThrAspLeuProArgGlnIleGluTrpAsn-303
305-AlaLeuAlaAlaPheGlnSer-311
316-GlyHisGlyTrpAsnSerPheAla-323
338-AspAsnLeuLeuSerAsnLeuPheThr-346
371-LeuLeuThrGlyIleAlaGlyLeuLeuLysArg-381
398-MetCysHisSerMetLeu-403
461-ArgLeuValAsnAlaPheSerPro-468
472-AspSerAlaLysThrLeuAsnArgLys-480
482-AsnGluLeuArgTyrIleSer-488
507-LeuProGluTyrProGluThr-513
549-AlaLysGlnTrpMetArgAlaThr-556
567-TyrAlaAspGluIleArgLysLeuProVal-576
579-ProLeuLeuProGluLeuLeuLysAspCysLysAlaPheAlaAlaAlaPro-595

Antigenic Index - Jameson-Wolf
37-LysLeuLysProSerProAspPheTyr-45

62-AlaGlyLysLysLeuPheAsp-68
124-PheGlyGlnGluArgIle-129
154-GlyTrpGluAspThrProLeu-160
177-GlyGlnArgAsnAsnLeuGly-183
196-LeuAsnGlyGlnArgLysIlePro-203
242-PheArgSerAspLysSerAsnArgArgThrMet-252
283-ThrAlaValGluArgValAlaAsnGlyGlyPheThrAspLeuProArgGlnIleGluTrp-302
316-GlyHisGlyTrpAsnSerPheAla-323
378-LeuLeuLysArgProLeuThr-384
424-ProAlaGluAlaSerAspGlyIleAlaPheLysLysAlaAla-437
468-ProAlaThrAspAspSerAlaLysThrLeuAsnArgLysIleAsnGlu-483
508-ProGluTyrProGluThrGlnThrTrpAlaGlu-518
520-AlaThrLeuLysSerLeuLysTyrArgProHisSerAla-532
542-ArgGlnGlyLysValAlaGluAlaLysGlnTrpMet-553
555-AlaThrGlnSerTyr-559
566-ArgTyrAlaAspGluIleArgLys-573
584-LeuLeuLysAspCysLysAla-590
595-ProGlyHisProGluAlaLysProCysLys-604

Hydrophilic Regions - Hopp-Woods
38-LeuLysProSerPro-42
62-AlaGlyLysLysLeuPheAsp-68
125-GlyGlnGluArgIle-129
198-GlyGlnArgLysIlePro-203
243-ArgSerAspLysSerAsnArgArgThrMet-252
283-ThrAlaValGluArgValAla-289
378-LeuLeuLysArgProLeuThr-384
425-AlaGluAlaSerAsp-429
431-IleAlaPheLysLysAlaAla-437
469-AlaThrAspAspSerAlaLysThrLeuAsnArgLysIleAsnGlu-483
525-LeuLysTyrArgPro-529
542-ArgGlnGlyLysValAlaGluAlaLysGlnTrpMet-553
566-ArgTyrAlaAspGluIleArgLys-573
584-LeuLeuLysAspCysLysAla-590
596-GlyHisProGluAlaLysProCysLys-604
739-2
AMPHI Regions - AMPHI
6-AsnLysProPheArgLeu-11
53-HisThrAspSerPro-57
88-GlnProAspGlyThrAsp-93
120-ThrAspArgGlnProAspAspAlaGlyThr-129
131-AlaGluAsnThrLeu-135

Antigenic Index - Jameson-Wolf
1-MetAlaLysLysProAsnLysProPheArgLeuThrPro-13
39-PheAsnProAsnGlyAspLysThrLeuGlnAlaGluProGlnHisThrAspSerProArgGluThrGluPhe-62
64-LeuProAsnGlyValValGlyGlnAspAlaAlaGlnProGluHisHisHis-80
82-AlaSerSerGluProAlaGlnProAspGlyThrAspGluSerGlySerGlyLeuProSerProAlaAlaProLysLysAsnArgValLysProGlnProAlaAspThrAlaGlnThrAspArgGlnProAspAspAlaGlyThrGlnAlaGluAsnThrLeuLysGluThrProValLeuProThrAsnValProArgProGluProArgLysGluThrProGluLysGlnAlaGlnProLysGluThrProLysGluAsnHisThrLysProAspThrProLysAsnThrProProLysProHisLysGluIleLeu-187

Hydrophilic Regions - Hopp-Woods

1-MetAlaLysLysProAsnLysProPheArgLeu-11
41-ProAsnGlyAspLysThrLeuGlnAlaGluProGlnHisThrAspSerProArgGluThrGlu-61
72-AspAlaAlaGlnProGluHisHisHis-80
82-AlaSerSerGluProAlaGlnProAspGlyThrAspGluSerGlySer-97
103-AlaAlaProLysLysAsnArgValLysProGlnProAlaAspThrAlaGlnThrAspArgGlnProAspAsp
AlaGlyThrGlnAlaGluAsnThrLeuLysGluThrPro-139
145-ValProArgProGluProArgLysGluThrProGluLysGlnAlaGlnProLysGluThrProLysGluAsn
HisThrLysProAspThrProLysAsnThrProProLysProHisLysGluIleLeu-187
740
AMPHI Regions - AMPHI
6-LeuValArgTrpLeuAlaVal-12
28-ProGluAspLysLeuGlnHisLeuIleAsnGlyIle-39

Antigenic Index - Jameson-Wolf
26-AsnProProGluAspLysLeuGln-33
57-IleLysHisHisLeuLysGlnGluPheAspLeuLysArgGlnThr-71

Hydrophilic Regions - Hopp-Woods
27-ProProGluAspLysLeuGln-33
57-IleLysHisHisLeuLysGlnGluPheAspLeuLysArgGlnThr-71
741
AMPHI Regions - AMPHI
32-GlyAlaGlyLeuAlaAspAlaLeuThrAla-41
93-SerArgPheAspPheIleArgGlnIleGlu-102
158-ThrSerPheAspLysLeuProGluGlyGlyArg-168
256-SerAlaGluValLysThrValAsnGlyIleArgHisIleGlyLeuAlaAlaLys-273

Antigenic Index - Jameson-Wolf
21-SerSerGlyGlyGly-25
43-LeuAspHisLysAspLysGlyLeu-50
56-AspGlnSerValArgLysAsnGluLysLeuLysLeu-67
71-GlyAlaGluLysThrTyrGlyAsnGlyAspSerLeuAsnThrGlyLysLeuLysAsnAspLysValSerArgP
heAspPhe-97
101-IleGluValAspGlyGlnLeu-107
117-ValTyrLysGlnSerHisSerAla-124
129-GlnThrGluGlnIleGlnAspSerGluHisSerGlyLysMetValAlaLysArgGlnPheArgIleGlyAsp
IleAlaGlyGluHisThrSerPheAspLysLeuProGluGlyGlyArgAlaThrTyrArg-172
174-ThrAlaPheGlySerAspAspAlaGlyGly-183
191-PheAlaAlaLysGlnGlyAsnGlyLysIleGluHisLeuLysSerProGluLeuAsnVal-210
213-AlaAlaAlaAspIleLysProAspGlyLysArgHisAla-225
234-AsnGlnAlaGluLysGlySerTyrSer-242
247-GlyGlyLysAlaGlnGluValAlaGly-255
257-AlaGluValLysThrValAsnGly-264

Hydrophilic Regions - Hopp-Woods
43-LeuAspHisLysAspLysGlyLeu-50
57-GlnSerValArgLysAsnGluLysLeuLysLeu-67
71-GlyAlaGluLysThrTyrGlyAsn-78
85-GlyLysLeuLysAsnAspLysValSerArg-94
101-IleGluValAspGly-105
132-GlnIleGlnAspSerGluHisSerGly-140
142-MetValAlaLysArgGlnPheArgIle-150
152-AspIleAlaGlyGlu-156
158-ThrSerPheAspLysLeuProGluGlyGlyArgAlaThrTyr-171
177-GlySerAspAspAlaGlyGly-183

195-GlnGlyAsnGlyLysIleGluHisLeuLysSerProGluLeuAsnVal-210
213-AlaAlaAlaAspIleLysProAspGlyLysArgHisAla-225
235-GlnAlaGluLysGlySer-240
249-LysAlaGlnGluValAlaGly-255
257-AlaGluValLysThr-261
742
AMPHI Regions - AMPHI
26-ArgGluValProAsp-30
53-AsnArgProLeuGln-57
66-GluAspTrpSerArgLeu-71
77-AsnLeuPheSerGlyPheLysHisValPheAsp-87
143-LysAlaLeuGluLysLeuLysAla-150
153-AspGluThrAlaLysGluTyrArg-160
234-AsnAlaAlaGlnArgPheProAsnSerLeuTyrAsp-245
326-ValTyrAlaGlySerCysGlnGlu-333
340-SerSerProLeuVal-344
369-ArgAsnAlaLysLysIle-374
422-ThrProAlaPheThrGlyPheSerGlyThrValProValTrpLysThrValLys-439
448-LeuTyrAsnTyrAlaLysTyrLeuAsnThrAsn-458
475-LeuHisLeuLeuGlyGlyLeuHisTyr-483
505-PheGlnThrAlaSerSer-510
543-IleTyrGlySerTyrThrLysIlePheLysGlnGlnAspAsn-556
616-GlySerPheGlnThrValAlaLysProIleGlyLysValValSerArg-631
643-GluAspTrpLysValPheAlaGly-650
657-ArgTyrLysAsnAla-661
670-AlaLysAsnSerSer-674
677-ProTyrAsnPheSerAsnPheThrProValHisIle-688
714-ThrSerSerLeuTyrAsnIle-720
725-TyrGlyLeuIleAspGlyPheValArgTyr-734
736-LeuGlyLysHisAlaLysLeu-742
759-TyrAsnArgThrArgGlyAlaAsnAsnPheTyrGlyGluPro-772

Antigenic Index - Jameson-Wolf
6-AlaGluAlaAspAlaGlyAsp-12
21-MetTyrGlnLysSerArgGluValProAspPheSerGly-33
37-ProCysGluAsnGlnLysThrAlaProPheSerSerThrProAlaCysAsnArgProLeuGlnLeuProArgA
snThrTyrLeuGlyGluAspTrpSerArgLeuSerAlaAspLysTyrAsn-77
86-PheAspAsnGlyTrp-90
97-SerTyrThrLysAsnGluSerAspAlaLysVal-107
120-LeuSerGlyGluAspAla-125
130-ThrGluLysAsnGluValIleProPheGluProLysAspLysAlaLeuGluLysLeuLysAlaTyrArgAsp
GluThrAlaLysGluTyrArgGluArgLysAspAspPheValLysAsnArgPheAspAsnThrAla-175
177-GluGlnTyrArgSerArgArgAlaAlaGluArgLysAlaGlyPheAspLysCysMetSerAspProPheAla
-200
205-CysGlnGlySerTrpGlyAspProGlyValAspAlaAspLysAlaGluPheValAsp-223
235-AlaAlaGlnArgPheProAsnSerLeuTyrAspSerSerPheAsnArgLysAlaThrAlaAsnArgArgTyr
SerTyrMetPro-262
264-ArgHisThrLysAspAspArgGlnTrp-272
286-GlyArgGluHisAsp-290
295-TyrAlaTyrGlyAspGluLysIleArgSerGluTyr-306
308-GluIleTyrGluArgArgTyrArgValArgProAsnThrGlyAla-322
328-AlaGlySerCysGlnGluGluProAspGlyAspLeuSer-340
345-ArgGlyHisLysGluProAspTrpGlnAlaTyrAspGluLysGlyAsnArgThrValTyrAlaGluGluCys
ArgAsnAlaLysLysIleLysThrGluProLysLeuAspAlaGluGlyLysGln-386
389-TyrTyrAspGluTyrSerGlySerArgThr-398

405-TyrGluLeuAspGluLysGlyAsnLysIleGlnGluThrAsnProAspGlyThrPro-423
439-LysValAlaAspAspHisVal-445
454-TyrLeuAsnThrAsnLysThrHis-461
485-ArgTyrGluThrSerGlnThrLysAspMetProValArgTyrGlyGlnProAlaSerAspPheGlnThr-50
7
509-SerSerIleArgAlaAspGlnAspHisTyrThr-519
521-LysMetGlnGlyHisLysLeuThrPro-529
545-GlySerTyrThrLys-549
551-PheLysGlnGlnAspAsnValAspValSerAla-561
584-GlyArgLeuAsnAla-588
595-LeuGluGlnLysAsnArgThrValVal-603
610-GlyAlaGlyGlyLysGlnGlySer-617
628-ValValSerArgGlyAlaGluPheGluLeuSerGlyGluLeuAsnGluAspTrpLys-646
652-ThrTyrAsnLysSerArgTyrLysAsnAlaAlaGluValAsnAlaGluArgLeuAlaLysAsnSerSerAla
AspProTyrAsnPheSerAsn-682
708-ValSerAlaGlnSerGlyThrSerSerLeuTyrAsnIleArgGlnGlyGly-724
735-GluLeuGlyLysHisAlaLys-741
746-GlyThrAsnLeuAsnGlyArgThrTyrPheGluAsnAsnTyrAsnArgThrArgGlyAlaAsnAsnPheTyr
GlyGluProArgThrValSerMet-777

Hydrophilic Regions - Hopp-Woods
6-AlaGluAlaAspAlaGlyAsp-12
23-GlnLysSerArgGluValProAsp-30
67-AspTrpSerArgLeuSerAlaAspLys-75
97-SerTyrThrLysAsnGluSerAspAlaLysVal-107
120-LeuSerGlyGluAspAla-125
130-ThrGluLysAsnGluValIleProPheGluProLysAspLysAlaLeuGluLysLeuLysAlaTyrArgAsp
GluThrAlaLysGluTyrArgGluArgLysAspAspPheValLysAsnArgPheAspAsnThrAla-175
177-GluGlnTyrArgSerArgArgAlaAlaGluArgLysAlaGlyPheAspLysCysMetSer-196
212-ProGlyValAspAlaAspLysAlaGluPheValAsp-223
247-SerPheAsnArgLysAlaThrAlaAsnArgArgTyrSer-259
264-ArgHisThrLysAspAspArgGlnTrp-272
286-GlyArgGluHisAsp-290
297-TyrGlyAspGluLysIleArgSerGluTyr-306
308-GluIleTyrGluArgArgTyrArgValArgProAsnThr-320
331-CysGlnGluGluProAspGlyAspLeu-339
345-ArgGlyHisLysGluProAsp-351
354-AlaTyrAspGluLysGlyAsnArg-361
363-ValTyrAlaGluGluCysArgAsnAlaLysLysIleLysThrGluProLysLeuAspAlaGluGlyLysGln
-386
393-TyrSerGlySerArg-397
405-TyrGluLeuAspGluLysGlyAsnLysIleGlnGluThrAsnProAspGly-421
439-LysValAlaAspAspHisVal-445
485-ArgTyrGluThrSerGlnThrLysAspMetProVal-496
500-GlnProAlaSerAsp-504
509-SerSerIleArgAlaAspGlnAspHisTyrThr-519
551-PheLysGlnGlnAspAsnValAspValSerAla-561
597-GlnLysAsnArgThrValVal-603
611-AlaGlyGlyLysGlnGlySer-617
628-ValValSerArgGlyAlaGluPheGluLeuSerGlyGluLeuAsnGluAspTrpLys-646
654-AsnLysSerArgTyrLysAsnAlaAlaGluValAsnAlaGluArgLeuAlaLysAsnSerSerAlaAsp-67
6
735-GluLeuGlyLysHisAlaLys-741
758-AsnTyrAsnArgThrArgGly-764
770-GlyGluProArgThrValSerMet-777

743
AMPHI Regions - AMPHI
19-TyrGlyGlySerPhe-23
58-SerTyrThrIleAsp-62
64-MetSerThrAlaThrGly-69
96-ThrLeuGluGluAlaMetLysAsnThrThrGlyValAsnValValArgAsp-112
158-ValTyrAspHisIleGluValValArgGlyAlaThrGly-170

Antigenic Index - Jameson-Wolf
1-MetAsnGlnAsnHis-5
30-ValSerAspGlyAsnThrVal-36
41-ValAsnValArgGlySer-46
51-GlyLysThrGluLysThrArgSerTyrThrIleAspArgMetSerThr-66
72-IleAlaGlyLysAspThrProGlnSer-80
85-ThrArgSerArgLeuAspAspLysAlaValHisThrLeuGluGluAlaMetLysAsnThrThrGly-106
109-ValValArgAspSerGlyLeuGlnThrArgPheLeuSerArgGlyPhe-124
128-GlnIleGlyGluAspGlyMet-134
140-GlyArgSerGlyTyrThrAlaLysIleAspValSerProSerThrAsp-155
163-GluValValArgGlyAlaThrGlyLeuThrGlnSerAsnSerGluProGlyGly-180

Hydrophilic Regions - Hopp-Woods
51-GlyLysThrGluLysThrArgSerTyrThrIleAspArgMetSerThr-66
72-IleAlaGlyLysAspThrProGln-79
85-ThrArgSerArgLeuAspAspLysAlaValHisThrLeuGluGluAlaMetLysAsn-103
109-ValValArgAspSerGlyLeu-115
128-GlnIleGlyGluAspGlyMet-134
174-SerAsnSerGluProGlyGly-180
744
AMPHI Regions - AMPHI
36-LeuAspGluLeuCys-40
65-AsnPheTyrLysAsnIleHisAlaThrThrLysPheValArgGluThrAspTyrSerLysPheIleGlnLeuL
ysLysAlaArgHisLeuThrValSerAspPheThrSerIleTrpLysValIleLeuTyr-108
124-SerSerIlePheAsnLysPheLysAlaLeuAspGluAlaIleAsnGluTyrTyrTyr-142
165-MetIlePheGlyLysPheValLysLeuGly-174
197-ArgLysPheLysAspAla-202
228-PheAspGluTyrHisGluCysValLysGlyLeuAlaAsn-240
270-IlePheAspSerLeu-274
299-TyrArgSerSerLysIlePheGlyValPheAspHisLeuLeuArgThr-314
322-LeuGluLysGlyAsnSer-327
338-AsnLeuHisAspGluTyrLysAsnLeuThrSerPheIleSerPhe-352
361-ArgAspIleLeuGlnMetLeu-367
416-TyrGlnAsnPheLeuLysPhePheGluPhe-425
434-TyrSerAspPheLeuLysAlaPheGluArgLeuLysLysHis-447
454-GluIleProLysPheMetSerThrAlaAsnGlu-464
473-AsnValIleAlaTyrLeu-478
515-SerGlyLeuSerLysAlaLeuAspValGly-524

Antigenic Index - Jameson-Wolf
15-AlaAsnTyrArgArgArgGluAsnLysAspLeuPhe-26
33-GlyGluTyrLeuAspGluLeuCysGluProAsnIle-44
48-IleGlyGluLysGlyThrGlyLysThr-56
64-AsnAsnPheTyrLys-68
75-LysPheValArgGluThrAspTyr-82
89-LysLysAlaArgHis-93
113-AsnGlnIleLysCysLysGluAsnGlyIle-122

131-LysAlaLeuAspGluAlaIleAsn-138

140-TyrTyrTyrGlyAlaPheAspProGluIle-149
157-GluAsnSerLysGluAlaAla-163
171-ValLysLeuGlyGluGluGluSerGln-179
184-ThrGluSerLysPhe-188
194-PheIleGluArgLysPheLysAspAlaLeuSer-204
206-LeuLysLeuLysAspAsn-211
217-AspGlyIleAspIleArgProSerGlnIleProPhe-228

230-GluTyrHisGluCysValLys-236
251-ProSerIleLysAspSerLysGlyArgMet-260
267-ArgProAspIlePheAspSerLeuGlyLeuGlnAsnGlnAsnThrLysLeuGlnAspAsnSerVal-288
291-AspTrpArgThrAspTyrLysSerTyrArgSerSerLysIle-304
312-LeuArgThrGlnGlnGluLysGlnAspSerLeuGluLysGlyAsnSerTrpAspTyrTyrProTrpAsn
AlaProAsnLeuHisAspGluTyrLysAsnLeu-346
353-LeuArgLysSerTyrTyrArgProArgAspIle-363
371-GlnLysAsnLysLysSerLysGluAspTyrValVal-382

384-GluAspPheAspAsnThrSerPheGlnArgGluTyrSer-396
412-SerGlnSerAspTyrGlnAsn-418
427-AsnGlyLysAspArgPheLysTyrSerAspPhe-437

439-LysAlaPheGluArgLeuLysLysHisLeuGln-449

454-GluIleProLysPhe-458
478-LeuAspAsnProGluAspGluThrLysPro-487
493-PheLysAspArgAsnTyrAlaAsnIleSerProLysIleLysThrGluThr-509
518-SerLysAlaLeuAsp-522

524-GlyThrProPheLysAsnLysGln-531

Hydrophilic Regions - Hopp-Woods
15-AlaAsnTyrArgArgArgGluAsnLysAspLeuPhe-26
34-GluTyrLeuAspGluLeuCysGlu-41
50-GluLysGlyThrGly-54
75-LysPheValArgGluThrAspTyr-82
89-LysLysAlaArgHis-93
115-IleLysCysLysGluAsnGlyIle-122
131-LysAlaLeuAspGluAlaIle-137
157-GluAsnSerLysGluAlaAla-163
171-ValLysLeuGlyGluGluGluSerGln-179
184-ThrGluSerLysPhe-188
194-PheIleGluArgLysPheLysAspAlaLeuSer-204

206-LeuLysLeuLysAspAsn-211
219-IleAspIleArgPro-223
230-GluTyrHisGluCysValLys-236
251-ProSerIleLysAspSerLysGlyArgMet-260
279-GlnAsnThrLysLeuGlnAsp-285
292-TrpArgThrAspTyrLysSerTyrArgSer-301

314-ThrGlnGlnGluLysGlnAspSerLeuGluLysGlyAsnSer-327
338-AsnLeuHisAspGluTyrLysAsn-345
356-SerTyrTyrArgProArgAspIle-363

371-GlnLysAsnLysLysSerLysGluAspTyrValVal-382

384-GluAspPheAspAsn-388

427-AsnGlyLysAspArgPheLysTyr-434

439-LysAlaPheGluArgLeuLysLysHisLeuGln-449
479-AspAsnProGluAspGluThrLysPro-487
493-PheLysAspArgAsnTyr-498
503-ProLysIleLysThrGluThr-509
527-PheLysAsnLysGln-531

745
AMPHI Regions - AMPHI
9-SerValThrAlaValIle-14
33-AspValIleLeuAsnAsp-38
116-CysThrAsnPheIleLysLeuTrpAsnAlaValSer-127
145-GluLeuGluIleLeuVal-150

Antigenic Index - Jameson-Wolf
21-IleAsnLysLysThrSerLysGlnLysAlaThr-31
37-AsnAspTyrGlnAsp-41
43-GlnPheValGluAlaAspAsnHisIleSerProTyrIle-55
58-ThrAlaValAspAspAsnAsnAlaArg-66
73-TyrGlnAsnLysGlyGlyGlnTrpGluLysGluArgGlyHis-86
102-AsnSerGlyValLeuAspGluAspLeuPheLys-112
132-LysIleArgGluGluGluArgLysAspThrIlePheArgGluLeuGlu-147
156-AsnProLeuLysAlaSerAspLeu-163

Hydrophilic Regions - Hopp-Woods
23-LysLysThrSerLysGlnLysAlaThr-31
43-GlnPheValGluAlaAspAsnHis-50
58-ThrAlaValAspAspAsnAsnAlaArg-66
76-LysGlyGlyGlnTrpGluLysGluArgGlyHis-86
105-ValLeuAspGluAspLeuPheLys-112
132-LysIleArgGluGluGluArgLysAspThrIlePheArgGluLeuGlu-147
156-AsnProLeuLysAlaSerAspLeu-163
746

AMPHI Regions - AMPHI
10-LeuSerGlyTyrGluGlnLeuLys-17
42-LeuSerSerGlyProAlaGluGlnThrAla-51
72-SerAlaAlaAspLysProGlnAsp-79
94-SerGluProGluAsn-98
118-LeuGluAlaSerGluLysLeuGlnGlnAlaGluThrAlaLysThrAlaPro-134
153-AspThrValAlaValGlu-158
160-ProLysArgThrAlaGluThr-166
170-LysAlaGluArgThr-174
184-ThrLysThrAlaGluLysValAlaAspLysProLys-195
210-SerAlaValLysGluAlaLysLysAlaAspLysAlaGluSer-223
238-GluThrAlaGlnLysThrAspLysAlaAspLysThrLysThrAlaGluLys-254
287-SerThrIleThrGluIleMetThr-294
307-TyrLysAsnAlaArgAspAlaGluArgAspLeu-317

Antigenic Index - Jameson-Wolf

1-MetSerGluAsnLysGlnAsnGluValLeuSerGlyTyrGluGlnLeuLysArgArgAsnArgArgArgLeuVa
lThr-26
43-SerSerGlyProAlaGluGlnThrAlaGlyGluThrSerGlyValGluAsnLysAlaAlaGly-63
68-ProAlaLeuLysSerAlaAlaAspLysProGlnAspLeuAlaGlyGluAspLysProSerAlaAlaAspSerG
luIleSerGluProGluAsnVal-99
108-GluArgLeuGluAspSerAsnIleLysGlyLeuGluAlaSerGluLysLeuGlnGlnAlaGluThrAlaLys
ThrAlaProLysGlnAlaLysGlnArgAlaAlaGluLysValProAlaThrAlaAspSerThrAspThrValAlaV
alGluLysProLysArgThrAlaGluThrLysProGlnLysAlaGluArgThrAlaLysAlaLysProLysAlaLy
sGluThrLysThrAlaGluLysValAlaAspLysProLysThrAlaAlaGluLysThrLysProAspThrAlaLys
SerAspSerAlaValLysGluAlaLysLysAlaAspLysAlaGluSerLysLysThrAlaGluLysAspArgSerA
spGlyLysLysHisGluThrAlaGlnLysThrAspLysAlaAspLysThrLysThrAlaGluLysGluLysSerGl
yLysLysAlaAla-262
266-GlyTyrAlaGluLysGluArgAlaLeuSerLeuGlnArgLysMetLysAlaAlaGlyIle-285
292-IleMetThrAspAsnGlyLysValTyrArgValLysSerSerAsnTyrLysAsnAlaArgAspAlaGluArg
AspLeuAsnLysLeuArgVal-322

Hydrophilic Regions - Hopp-Woods
1-MetSerGluAsnLysGlnAsnGluVal-9
14-GluGlnLeuLysArgArgAsnArgArgArgLeuVal-25
45-GlyProAlaGluGlnThrAlaGlyGluThrSerGlyValGluAsnLysAlaAlaGly-63
68-ProAlaLeuLysSerAlaAlaAspLysProGlnAspLeuAlaGlyGluAspLysProSerAlaAlaAspSerG
luIleSerGluProGluAsnVal-99
108-GluArgLeuGluAspSerAsnIleLysGlyLeuGluAlaSerGluLysLeuGlnGlnAlaGluThrAlaLys
ThrAlaProLysGlnAlaLysGlnArgAlaAlaGluLysValProAlaThrAlaAspSerThrAsp-153
155-ValAlaValGluLysProLysArgThrAlaGluThrLysProGlnLysAlaGluArgThrAlaLysAlaLys
ProLysAlaLysGluThrLysThrAlaGluLysValAlaAspLysProLysThrAlaAlaGluLysThrLysProA
spThrAlaLysSerAspSerAlaValLysGluAlaLysLysAlaAspLysAlaGluSerLysLysThrAlaGluLy
sAspArgSerAspGlyLysLysHisGluThrAlaGlnLysThrAspLysAlaAspLysThrLysThrAlaGluLys
GluLysSerGlyLysLysAlaAla-262
267-TyrAlaGluLysGluArgAlaLeuSerLeuGlnArgLysMetLysAlaAlaGlyIle-285
292-IleMetThrAspAsnGlyLysValTyrArgValLysSerSerAsnTyrLysAsnAlaArgAspAlaGluArg
AspLeuAsnLysLeuArgVal-322
747
AMPHI Regions - AMPHI
24-AlaSerArgAspValSerLysSerAlaLysGlyTrp-35

Antigenic Index - Jameson-Wolf
8-TyrAlaAspLeuArgGlyLysThrLysVal-17
23-GlyAlaSerArgAspValSerLysSerAlaLysGlyTrp-35
42-AsnValGlyLysGlnLeuThrAspSerValGlyLeuGluPheAspProTyrTyrArgHisLysThrIleTyrL
ysProArgGluIleValLeuAspGlyAspLysThrLysMetGlyArgSerLysSerAsnGluTyrGly-88
97-SerGlnLeuLysSerLys-102

Hydrophilic Regions - Hopp-Woods
8-TyrAlaAspLeuArgGlyLysThrLysVal-17
23-GlyAlaSerArgAspValSerLysSerAlaLys-33
63-ThrIleTyrLysProArgGluIleValLeuAspGlyAspLysThrLysMetGlyArgSerLysSerAsnGluT
yr-87
748
AMPHI Regions - AMPHI
22-GlyAlaValGlyAlaIleGlyGly-29
37-GlyGluThrAlaGluArgThrAlaGluSerGlnHis-48
82-SerAlaLysGlnLeuGluAsnLeuPheArgThrLeu-93
155-LeuGlnGluMetArgAspPheSerAsnAspLysLeuGlnLysSerTrp-170
188-GlnAlaAlaLeuArgAspIleIleLysHisThrValGln-200

250-GlyValAlaAlaAsnSer-255
257-AspGluProGluTrp-261
268-GlnAlaValArgLeuIleArgHisPheValGluPheTrpAspArg-282
310-GlnProAspPheAlaLysAspProGlu-318
334-ArgAspProGluPheLeu-339
390-LeuGluGluTyrIleSerProPhe-397

Antigenic Index - Jameson-Wolf
1-MetSerLysLysGlnProAlaGlnProThrArgArgThrLeuPhe-15
30-TyrLeuGlyGlyLysLysGlnGlyGluThrAlaGluArgThrAlaGluSerGlnHisSerProGlnAla-52
80-AlaGlnSerAlaLysGlnLeuGluAsn-88
101-ThrGlnGlyGlyGluTyrGlnAspGlyAspAspLysLeuProProAlaGlySerGly-119
125-PheAsnProAspGlyLeuThr-131
139-SerLeuPheAspGlyArgPheGlyLeuLysAspLysLysProIleHis-154
156-GlnGluMetArgAspPheSerAsnAspLysLeuGlnLysSerTrpCysAspGlyAspLeuSer-176
183-ThrProGluThrCys-187
208-IleAspGlyTrpGlnProLysSerGluProGlyAlaMetAla-221
226-LeuGlyPheArgAspGlyThrGlyAsnProLysValSerAspProLysThrAlaAspGlu-245
255-SerLeuAspGluProGluTrpAlaLysAsnGlySerTyrGlnAla-269
279-PheTrpAspArgThrProLeuGlnGluGlnThrAspIlePheGlyArgArgLysTyrSerGlyAlaProMet
AspGlyLysLysGluAlaAspGlnProAspPheAlaLysAspProGluGlyAspIleThrProLysAspSerHisI
leArgLeuAlaAsnProArgAspProGluPheLeuLysLysHisArgLeuPheArg-346
348-AlaTyrSerTyrSerArgGlyLeuAlaSerSerGlyGlnLeu-361
385-LeuAsnGlyGluProLeuGluGluTyr-393
406-ProGlyValGluLysGlyGlyPhe-413

Hydrophilic Regions - Hopp-Woods
1-MetSerLysLysGlnProAlaGlnProThrArgArgThrLeuPhe-15
32-GlyGlyLysLysGlnGlyGluThrAlaGluArgThrAlaGluSerGlnHisSer-49
80-AlaGlnSerAlaLysGlnLeuGluAsn-88
104-GlyGluTyrGlnAspGlyAspAspLysLeuProPro-115
145-PheGlyLeuLysAspLysLysProIleHis-154
156-GlnGluMetArgAspPheSerAsnAspLysLeuGlnLysSerTrpCysAspGlyAspLeu-175
211-TrpGlnProLysSerGluProGlyAlaMetAla-221
229-ArgAspGlyThrGlyAsnProLysValSerAspProLysThrAlaAsp-244
255-SerLeuAspGluProGluTrpAlaLys-263
283-ThrProLeuGlnGluGlnThrAspIlePheGlyArgArgLysTyrSer-298
301-ProMetAspGlyLysLysGluAlaAspGlnProAspPheAlaLysAspProGluGlyAspIleThrProLys
AspSerHisIle-328
331-AlaAsnProArgAspProGluPheLeuLysLysHisArgLeuPheArg-346
388-GluProLeuGluGluTyr-393
407-GlyValGluLysGlyGly-412
749
AMPHI Regions - AMPHI
20-CysGlnProProGluAla-25

140-AlaAspLeuGluLysLeuSerGlnProLeuAla-150
157-GlnGlyGluValLysGluLeuVal-164
169-ThrPheThrGluAlaValLysAlaGlyAspIleGluLysAla-182
196-IleGluProIleAlaGluLeuPheSerGluLeuAspPro-208
224-AlaGlyPheThrGlyPheHisArg-231
243-SerGlyValLysGluIleAlaAlaLysLeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264
274-ValGlyGlyAlaSerGluLeuIleGluGluValAlaGly-286
309-AspGlySerLysLysIleValAspLeuPheArgProLeu-321
337-PheLysGlnValAsnGluIleLeuAlaLys-346

351-AspGlyPheGluThrTyrAspLysLeuGlyGlu-361
366-AlaLeuGlnAlaSerIleAsnAlaLeuAlaGluAspLeuAlaGlnLeuArgGlyIleLeuGlyLeu-387

Antigenic Index - Jameson-Wolf

1-MetArgLysPheAsn-5
21-GlnProProGluAlaGluLysAlaAlaPro-30

32-AlaSerGlyGluAlaGlnThrAlaAsnGluGlyGlySer-44
50-AsnAspAsnAlaCysGluProMetGlu-58
70-IleLysAsnAsnSerGlyArgLysLeuGluTrpGluIle-82
87-MetValValAspGluArgGluAsnIleAla-96

98-GlyLeuSerAspLysMetThr-104
108-LeuProGlyGluTyrGluMet-114
120-ThrAsnProArgGlyLysLeuValValThrAspSerGlyPheLysAspThrAlaAsnGluAlaAspLeuGlu
LysLeuSer-146
158-GlyGluValLysGluLeuValAlaLysThrLysThrPheThrGluAlaValLysAlaGlyAspIleGluLys
AlaLysSerLeuPheAla-187

189-ThrArgValHisTyrGluArgIleGluProIle-199
204-SerGluLeuAspProValIleAspAlaArgGluAspAspPheLysAspGlyAlaLysAspAlaGly-225
238-ValGluLysAspValSerGlyValLysGluIleAlaAla-250

252-LeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264
269-ProProGlyLysValValGlyGlyAla-277

279-GluLeuIleGluGluValAlaGlySerLysIleSerGlyGluGluAspArgTyrSerHisThrAspLeuSer
AspPheGlnAlaAsnValAspGlySerLysLysIleValAsp-316
322-IleGluAlaLysAsnLysAlaLeuLeuGluLysThrAspThrAsnPheLysGlnValAsn-341
345-AlaLysTyrArgThrLysAspGlyPheGluThrTyrAspLysLeuGlyGluAlaAspArgLysAlaLeu-36
7
374-LeuAlaGluAspLeuAlaGln-380

Hydrophilic Regions - Hopp-Woods
1-MetArgLysPheAsn-5
21-GlnProProGluAlaGluLysAlaAlaPro-30

32-AlaSerGlyGluAlaGlnThrAlaAsnGluGlyGlySer-44
52-AsnAlaCysGluProMetGlu-58
72-AsnAsnSerGlyArgLysLeuGluTrpGluIle-82
87-MetValValAspGluArgGluAsnIle-95
99-LeuSerAspLysMetThr-104
110-GlyGluTyrGluMet-114
122-ProArgGlyLysLeuValVal-128
131-SerGlyPheLysAspThrAlaAsnGluAlaAspLeuGluLysLeuSer-146
158-GlyGluValLysGluLeuValAlaLysThrLysThrPheThrGluAlaValLysAlaGlyAspIleGluLys
AlaLysSerLeuPheAla-187

189-ThrArgValHisTyrGluArgIleGluProIle-199
204-SerGluLeuAspProValIleAspAlaArgGluAspAspPheLysAspGlyAlaLysAspAlaGly-225
238-ValGluLysAspValSerGlyValLysGluIleAlaAla-250

252-LeuMetThrAspValGluAlaLeuGlnLysGluIleAsp-264